FEBRUARY 1957

GAS

PRESSURE SCHEME FOR NEW DISTRIBUTION SYSTEMS

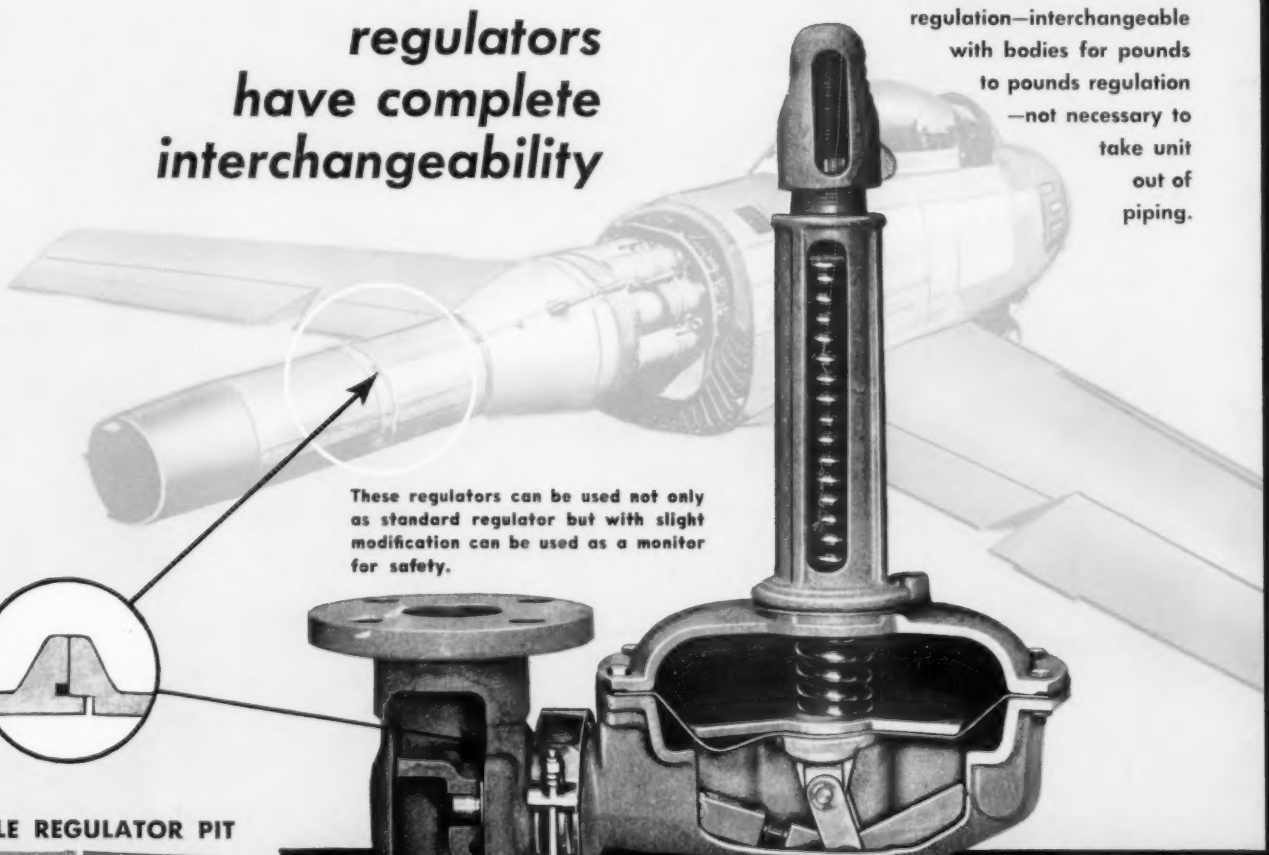
A CHILTON PUBLICATION

ENGINEERING • UTILIZATION • PIPELINES • MANAGEMENT

REYNOLDS

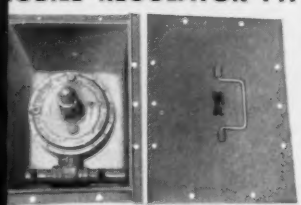
regulators have complete interchangeability

Bodies for pounds to inches regulation—interchangeable with bodies for pounds to pounds regulation —not necessary to take unit out of piping.



These regulators can be used not only as standard regulator but with slight modification can be used as a monitor for safety.

OBILE REGULATOR PIT



Only Reynolds Regulators can be used and interchanged in tight quarters.

Reynolds Gas Regulator Co.

Anderson, Indiana, U.S.A.

...can be used and interchanged
in tight quarters.

MAKING GAS BEHAVE WITH Reliance

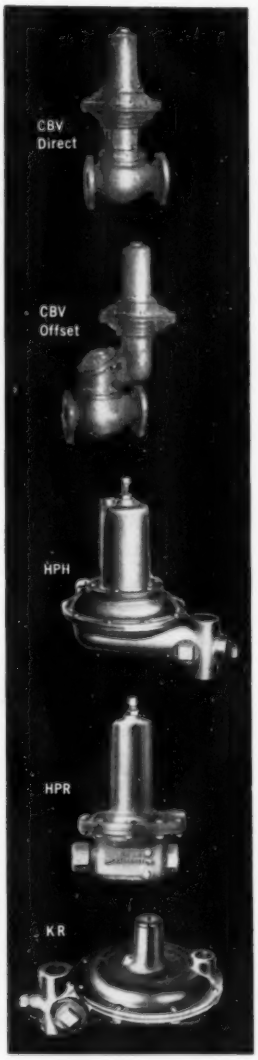
YESTERDAY.....

About 3000 years ago the first pipeline was installed by orientals using hollowed-out stems of bamboo trees to pipe natural gas. From this simple origin has arisen today's huge natural gas and pipeline facilities with controlled safety.

TODAY.....

The Gas Industry grows larger and larger, with more markets, more tapped and untapped supplies of gas, more pipelines criss-crossing the country to bring controlled gas service within reach of virtually every home owner and industrial user.

Throughout this great Industry you'll find Regulators, Valves, Filters and Meters MAKING GAS BEHAVE WITH *RELIANCE.*



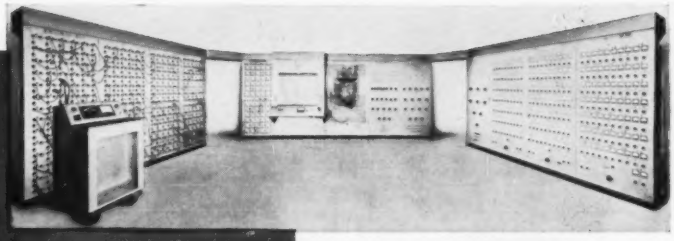
BULLETINS ARE AVAILABLE ON ALL TYPES OF **RELIANCE REGULATORS**

AMERICAN® METER COMPANY
INCORPORATED (ESTABLISHED 1836)

RELIANCE REGULATOR DIVISION
ALHAMBRA, CALIFORNIA

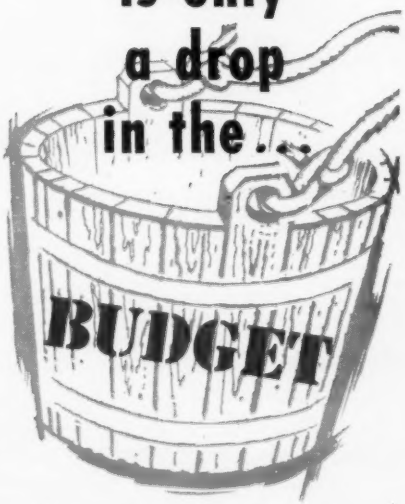
Anderson, Indiana, U.S.A.

When You Spend Millions



TO KEEP PACE WITH THE GROWTH AND PROGRESS OF A METROPOLITAN AREA

The Cost of a McILROY FLUID NETWORK ANALYZER is only a drop in the...



THE KIPLINGER WASHINGTON LETTER
of Dec. 22, 1956 says:—

"Total population of the U. S. grows so fast you lose track of it. 40 years ago, 100,000,000. 10 years ago, 141,000,000. NOW 170,000,000. By 1975, 221,000,000 . . . and that's a lot of people to be fed, clothed, housed, and otherwise serviced . . . potential customers within our system."

THE NEW, DYNAMIC AMERICA IS HERE

Automation, nuclear power, man-made satellites are no longer a dream and five-year plans become obsolete overnight. To meet this huge, dynamic growth in population

ADEQUATE DISTRIBUTION BY UTILITIES DEMANDS LONG RANGE PLANS

To THE GAS INDUSTRY this means that during the lifetime of a McIlroy Analyzer distribution facilities in many cases must be more than doubled — involving endless surveys, analyses, plans construction and equipment . . .

ALL COSTING MILLIONS IN MONEY!

To spend far ahead, you must be able to see far ahead. And that is the McIlroy's job — to help you look before you leap. With uncanny accuracy, amazing speed, and extremely low final cost the McIlroy checks the validity of each step in your proposed program *before* you spend a cent.

With a McIlroy Analyzer you can not only *pre-test* your long range plans for network expansion but analyze your immediate day-to-day problems. Think how this can prevent disastrous waste of engineering and construction time, of materials and labor that can easily run into millions!

Let us send you a list of McIlroy users.

That's why we say **the cost of a McIlroy is only a drop in any budget**

The STANDARD ELECTRIC TIME COMPANY

125 Logan Street
Springfield 2
Massachusetts

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33RD YEAR OF PUBLICATION • VOLUME XXXIII • NUMBER 2

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GAS is published monthly. Copyright 1957 by Chilton Company, 56th and Chestnut Streets, Philadelphia 39, Pa. Subscription price: United States and possessions and Canada (in advance): one year, $2.00; two years, $3.00. Mexico, South and Central America, Caribbean Area: one year, $3.00; two years, $5.00. All other countries: $10 per year.
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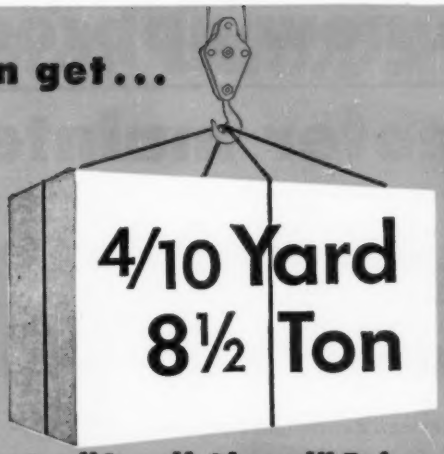
Why take less when you can get...

MORE!

MORE Big Shovel Features
MORE Capacity
MORE Work and Profits



at a "Small Shovel" Price

With the all new 4/10 Yard 8½ ton 85A "QUICK-WAY"®

When you can make money with a small outfit, think how much more money you can make with the husky "QUICK-WAY" 85A. Why be satisfied with a 6 or 7 tons in the ⅜ yard class when you can get 8½ tons in the 4/10 yard "QUICK-WAY" 85A—and for approximately the same price.

The new "QUICK-WAY" 85A has more Big Shovel Features than any other in the small shovel field. It has been engineered to meet rugged, heavy-duty specifications with fewer moving parts. The power train is oversize, all shafts are splined for easy maintenance. Extra strength has been built in the machinery frame and gantry for greater lifting power. It has been simplified for easy, economical maintenance of all parts. It operates smoothly and quietly with maximum production and minimum operator fatigue.

The All New "QUICK-WAY" Crawlers 85AC and 105AC

Now you can get the "QUICK-WAY" 85A and 105A on a crawler! You get the same "QUICK-WAY" Big Shovel Features on the crawler that gets to its job easily, stays with the work, even in close, restrictive quarters. The new "QUICK-WAY" Crawler has independent travel—forward and reverse speeds of ⅞ miles per hour in low range and 1¾ miles per hour in high range. It is now available in 16" crawler shoes (5.1 psi ground pressure), 24" crawler shoes (3.5 psi ground pressure), and 32" crawler shoes (2.5 psi ground pressure). Width of 95" has been especially designed for hauling on trailers.

• The Most Complete Line in the Small Shovel Field with 5 Models—105A 5/10 yd., 10½ Tons—105AC 5/10 yd., 7 tons —125A 6/10 yd., 12½ Tons—with the famous money-making line of "QUICK-WAY" attachments for all models.

1 **SIMPLIFIED CHAIN AND GEAR DRIVE** for efficient, quiet operation—the combination of roller chains and precision machined gears gives efficient transmission of power through the minimum number of moving parts. Standard engine 47HP @ 1800 rpm.

2 **MAIN HOIST AND HAUL BACK DRUMS** are mounted on a single, accessible shaft with sealed antifriction bearings. Two-piece cast laggings are easily changed. Large clutch and brake drums have separated surfaces with louvres for cooling.

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4 **OVERSIZE CLUTCHES** have more surface—for smoother, positive action. Hydraulically operated for easy, sure application of power, giving the operator the feel of the load at all times.

5 **POWER UP AND DOWN BOOM HOIST IS STANDARD.** Simple precision design makes safe, sure operation. A one-piece cast steel unit contains pawl teeth, windlass and brake drum. The cable end is located in an easily accessible place for quick attachment change-over.

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"QUICK-WAY" TRUCK SHOVEL CO. • DENVER, COLO. Pres-Ness Subsidiary

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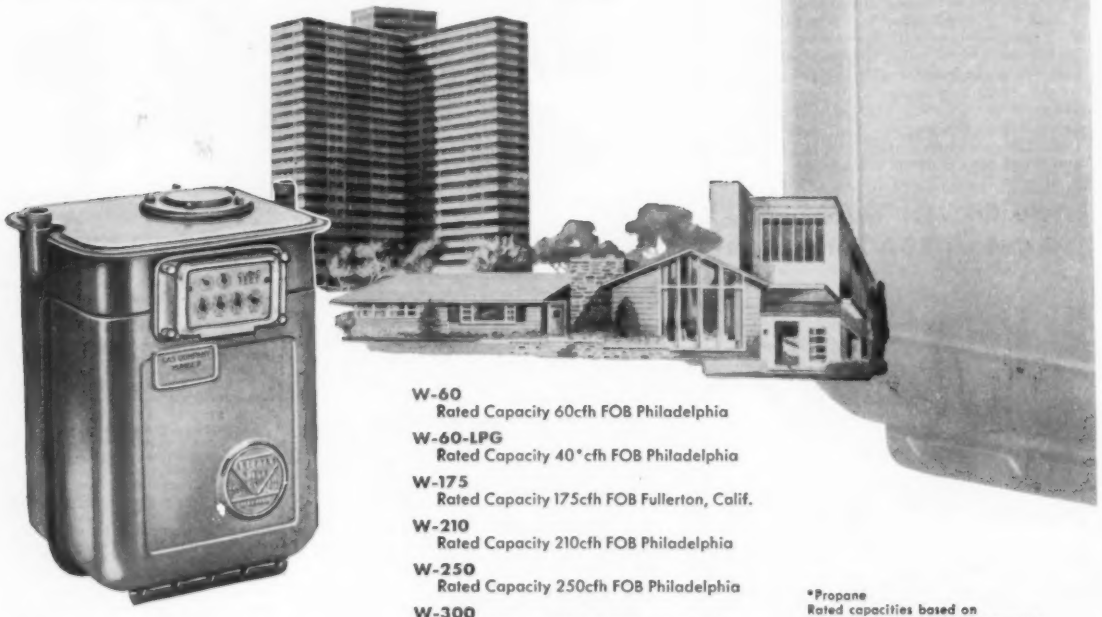
A new approach to meter maintenance and retirement

AMERICAN® "W" Series Welded Steelcase Meters

American's complete line of *advance design* Welded Steelcase Meters presents a completely new concept in meter maintenance and retirement.

These new Welded Steelcase Meters are sturdy and accurate, lighter than "hardcase" models, yet comparable in application, bringing proven tin meter accuracy possibilities to intermediate pressure meters. Every field-proven design feature pioneered by American is incorporated. A new weather and corrosion resistant coating insures lifetime protection for all normal outdoor sets. Special impervious coating for highly corrosive atmospheres is available at additional cost.

For complete information on this new concept in the science of gas metering, consult your American Meter representative.



W-60
Rated Capacity 60cfh FOB Philadelphia

W-60-LPG
Rated Capacity 40*cfh FOB Philadelphia

W-175
Rated Capacity 175cfh FOB Fullerton, Calif.

W-210
Rated Capacity 210cfh FOB Philadelphia

W-250
Rated Capacity 250cfh FOB Philadelphia

W-300
Rated Capacity 300cfh FOB Philadelphia

*Propane
Rated capacities based on 0.64 sp. gr. gas at ½-inch pressure drop — 5 psi working pressure.

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INCORPORATED ESTABLISHED 1836

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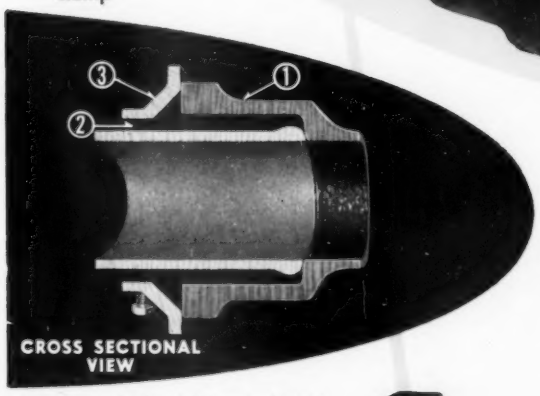
Simplified Bell Joint Clamps

1. Bell joint
2. Perma-Seal Compound
3. Bell joint clamp



SEALED BY ADHESION

WITH PERMA-SEAL COMPOUND

WITH THE FOLLOWING ADVANTAGES:

- Smaller street openings required because no excavating or cleaning necessary in back of the bell.
- The clamp does not require adjustment, or filling and facing of the bell.
- ***The clamp is engineered to fit all variable pipe wall thicknesses without adjustment and to fit all types of bell joints including sleeves, drip pots, valves and odd size pipes.*** Available sizes: 3" to 36" diameter.
- This clamp fits in confined areas because it requires no greater area than the existing bell for installation.
- ***This leak clamp becomes a seal by adhesion rather than by compression.***
- This clamp allows ground movement and vibration to take place without the danger of leaks after installation.
- Once installed the joint becomes trouble-free and permanent.

Write: for full information and prices about the Newest Method in Pipe Connections

New Perma-Seal and Safety Seal Weld sleeves available for steel to steel, steel to cast iron, split sleeves for repair of steel pipe, and completely insulated sleeves for corrosion control.

Typical installation in the removal of valve and replaced with safety seal weld sleeves.

Steel to steel sleeve

Cast to cast sleeve

UNITED PIPE UTILITY SUPPLIERS, INC. BOX 777, BELOIT, WISCONSIN

GAS Thermally Thinking

Engineers in the gas industry

AGA recently announced a program for producing candidates from the engineering grab-bag for employment in gas companies. It is a much needed, laudable advertising effort. Media will be 75 or so college engineering magazines. Pilot ads show several engineers who have carved outstanding careers within the gas industry in relatively short periods. Our only comment—one of the ads shows some spreadwork that may scare more than a few of our modern youth off.

I share the industry's concern over the difficulty of attracting the young engineers for cadet training. However, I am even more concerned about what recruited young men will find in the gas industry.

On entering the employment of a gas company, the young engineer will probably be placed in a training program of some sort. Training programs are expected. But, if an engineer can't be given some really responsible work after a year or two on a "training" cycle, his employment should be terminated. Many gas companies consider a young employee—an engineer or otherwise—a "beginner" for a painfully long time.

Many times we see engineers in the gas industry doing a little bit of everything except engineering. Such policy is not known to produce longevity of employment. An engineer doing clerical work (even if it is within the engineering department) is an unhappy employee.

Gas companies tend to let their operations get into a rut. Some companies will not pioneer anything. Engineers find it hard to work for the non-pioneering set. If an engineer is limited in his work to design fundamentals established 25 years ago within his company, his creative ability is not being efficiently used. He will look for a position in or outside of the industry where his creative ability will be appreciated. Too often these days, he finds this appreciation outside of the gas industry.

In addition, there are the problems of promotion, recognition of ability, and salary. These are not necessarily problems relating to engineers alone.

Most serious of the salary considerations grows out of the recruitment of young engineering graduates. In bidding with other companies and industries for the engineers, starting salaries go up. What happens to engineers already on the payrolls? Too often, their salaries are not increased in relation to the starting salary bracket. Then, you have engineers with two, five, or even more years experience with a gas company being paid very little more than the figure at which the new cadet engineer starts.

Certainly the gas companies do need more young engineering talent. But the advertising for and successful recruitment of these engineering graduates is not the whole answer. In this technical age, the young engineers must be given an adequate program for development. More important is the policy of management and development of engineers now on the staffs. They will stick in the gas industry only if they are utilized and paid as professional, creative people.

J. Fred Ebdon

EDITOR

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Tel. DUnkirk 7-4337

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How Southern Union Gas Company meets the problem of Excess Demand

Mixing and pumping facilities, Southern Union Gas Company propane-air plant at Albuquerque, New Mexico. Erected by J. F. Pritchard & Co., Engineers, Kansas City, Mo.

Cutler-Hammer Calorimixer and Calorimeter, part of gas-mixing and stabilizing equipment in Albuquerque plant.

Cutler-Hammer Gas-Mixing Equipment in Albuquerque Propane-Air Plant automatically stabilizes and delivers gas in volumes to match demand

It is not possible to calculate the gas demands of a municipality accurately. Anyone of a number of unpredictables can upset calculations and create excessive demands upon the established natural gas supply. Southern Union Gas Company is one of a number of utilities solving this problem by the erection of propane-air, peak-shaving plants where gas heating value, pressure and volume are handled completely and automatically by Cutler-Hammer Gas-Mixing Equipment designed and engineered by Cutler-Hammer engineers to the customer's specific requirements. Such plants are highly efficient and economical.

Cutler-Hammer Equipment makes operation automatic; heating value and pressure are *always* and automatically stabilized to a preset figure; delivery of gas *always* and automatically matches demand. Such C-H equipped plants are *always* ready to supplement the basic gas supply and take over completely in the event of an emergency failure of basic supply. If you want further information about this most efficient and economical of all peak-shaving plants, write or wire at once. CUTLER-HAMMER, Inc., 1468 St. Paul Avenue, Milwaukee 1, Wisconsin.

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B.t.u. CONTROL
C-H

GAS highlights

SPOT NEWS, TRENDS, COMMENT ON GAS INDUSTRY AFFAIRS

FEBRUARY 1957

Backers of the Houston Texas Gas & Oil Corp.-Coastal Transmission Corp. project are going ahead in an attempt to renegotiate their contracts to meet the conditions set down by the FPC. Chief stumbling block now is getting Florida Power & Light Co. and Florida Power Corp., who will use nearly 60 per cent of the line's capacity, to agree to removal of the cancellation provisions from the contracts. The FPC order absolutely required their removal. These provisions would permit the utilities to drop gas if the price reached that of fuel oil. Florida Power & Light has been insistent upon the inclusion of the cancellation provision in the contracts, while Florida Power has not been as adamant.

Houston-Coastal officials say that preliminary talks indicate both companies may be willing to drop these clauses, but it is still too early to be certain. Should either utility drop out, Houston-Coastal says it has alternative customers lined up.

Conditions imposed on the project's backers by the FPC force the renegotiation of 44 contracts, and will delay the start of construction at least 45 days. Houston-Coastal originally had planned to start construction in April.

GAMA is polling its members on whether or not they want to hold an exhibit at the AGA's 1958 convention in Atlantic City. Acting on an AGA request for such an exhibit, GAMA officials have recommended that all booths be standardized with 5-ft backgrounds (instead of the usual 8-ft ones); that no exhibitor be allowed to occupy more than a limited number of booths; that the exhibit be limited to three days; that the hours be limited so that one shift of men might man the booth, and that any surplus funds be refunded to the exhibitor on a pro rata basis. Results of the GAMA poll should be known this month.

President Eisenhower's budget message has given the gas industry new hopes for favorable legislation to free producers from FPC control. In his message, the President asked Congress for "legislation freeing gas producers from public utility-type regulation." Mr. Eisenhower termed it "essential if the incentives to find and develop new supplies of gas are to be preserved and sales of gas to interstate markets are not to be discouraged to the detriment of both consumers and producers."

Gas companies will continue their expansion programs at record breaking paces during 1957, budgets released by many companies indicate. Here are a few examples . . . Southern California Gas Co. (Los Angeles) will spend $44 million, largest sum in its 89-year history, on new facilities. Biggest amount, $21 million, will go for gas storage and transmission facilities . . . Southern Counties Gas Co. (Los Angeles) also will set a record this year, with $24.4 million budgeted . . . Atlanta (Ga.) Gas Light Co. has allotted $8.8 million, a new high, for expansion of its distribution systems in 50 communities . . . Peoples Natural Gas Co. (Pittsburgh) has announced plans to spend $7.4 million for expanding its systems in western Pennsylvania . . . Dominion Natural Gas Co. (Brantford, Ont.) will spend $2.5 million to enlarge its distribution system in anticipation of large supplies of natural gas expected in 1958 . . . Atlantic City's South Jersey Gas Co. will spend $1.7 million on new construction this year . . . Cascade Natural Gas Co. (Seattle, Wash.) will spend $1.35 million to build new distribution systems and expand existing ones in the 32 Pacific Northwest cities it serves this year . . . Lone Star Gas Co. (Dallas) and its wholly owned subsidiary, Lone Star Producing Co. will spend a record $30.8 million on new construction this year. The parent company will require $19.8 million for its program, with the balance going to Lone Star Production.

Westcoast Transmission Co. Ltd. will spend $100 million to expand its 80 per cent completed pipeline system in British Columbia. Westcoast President Frank M. McMahon said that $55 million will be spent to enlarge capacity of the mainline from 400 MMcf/day to 660 MMcf/day, and $45 million will go for construction of a 174-mile 30-in. line from Alberta's Savanna Creek field to Kingsgate, B. C. where gas will be exported to Pacific Northwest Pipeline Corp. A new sulfur plant also will be built in the Savanna Creek area. Westcoast has contracted to buy 125 MMcf of Savanna Creek gas daily from Phillips Petroleum Co.

Pacific Gas & Electric Co. (San Francisco), which serves central and northern California, has recorded 79 per cent increase in gas customers in the past 10 years. PG&E now serves 1,406,722 gas customers, as compared to 783,989 a decade ago.

A new annual average dividend peak of $1.88 per share was achieved by natural gas common stocks at the end of December, a gain of 9.9 per cent over the previous year-end average of $1.71, the AGA reports. The index of common stock prices rose to $39.61 per share, up 6.8 per cent over 1955. Current yield is now 4.75 per cent, a 3 per cent gain over 1955.

16" Feeder Gas Main in a Large Mid-western City Subdivision.

to judge the future, study the past

One sound indication of what a product will do is...what it has done.

For example: the record of cast iron pipe in the gas industry. Over a hundred years ago, 40 American gas companies installed cast iron mains that are still in service. Hundreds of other companies are using cast iron gas mains with 50 and more years of operation behind them.

This record speaks for itself. And its message is crystal clear: no other pipe can match cast iron for long life. For dependability. For long-term dollars-and-cents economy.

Equally important, the modernized cast iron pipe being produced today is even more uniform and dependable.

Here's the "WHY" Behind Cast Iron Dependability

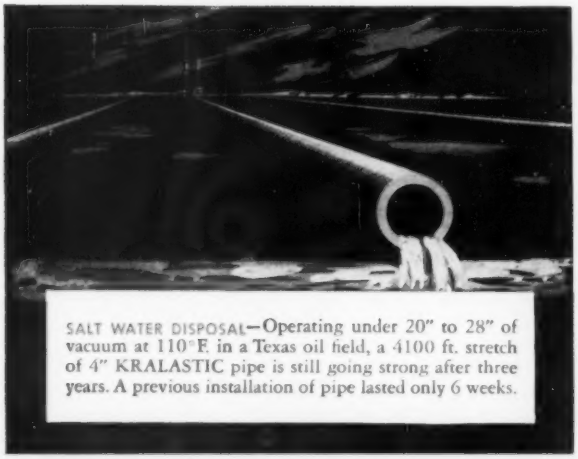
- Standardized mechanical joints are bottle-tight for usual gas pressures . . . and for all types of gas.
- Centrifugally cast pipe is tough, strong and uniform.
- Joint design allows for deflection during and after installation.
- Service connections are easily made.
- Long life a matter of record.
- No shortage. Cast Iron Pipe is available.

U.S. cast iron PIPE
CAST IRON

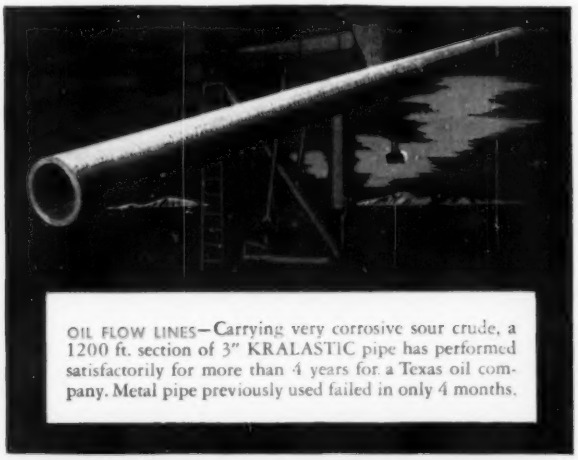
U. S. PIPE AND FOUNDRY COMPANY
General Office: Birmingham 2, Alabama

A WHOLLY INTEGRATED PRODUCER
FROM MINES AND BLAST FURNACES TO FINISHED PIPE.

KRALASTIC Corrosion-Proof Pipe Makes Good in Many Fields!

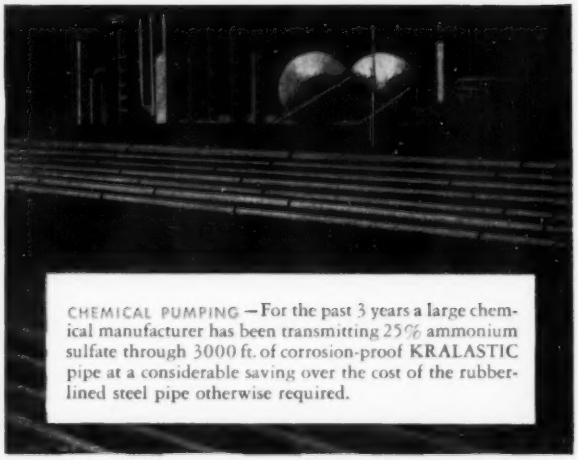


SALT WATER DISPOSAL—Operating under 20" to 28" of vacuum at 110°F. in a Texas oil field, a 4100 ft. stretch of 4" KRALASTIC pipe is still going strong after three years. A previous installation of pipe lasted only 6 weeks.



OIL FLOW LINES—Carrying very corrosive sour crude, a 1200 ft. section of 3" KRALASTIC pipe has performed satisfactorily for more than 4 years for a Texas oil company. Metal pipe previously used failed in only 4 months.

GAS LINES TO IRRIGATION PUMPS—In the Texas Panhandle a small crew recently laid 140 miles of KRALASTIC pipe 3 feet deep in 31 days. Texas farmers now have more than 1000 miles of KRALASTIC pipe carrying natural gas to irrigation pump engines.



CHEMICAL PUMPING—For the past 3 years a large chemical manufacturer has been transmitting 25% ammonium sulfate through 3000 ft. of corrosion-proof KRALASTIC pipe at a considerable saving over the cost of the rubber-lined steel pipe otherwise required.

KRALASTIC®, a unique combination of plastic and elastomeric materials, is different both in composition and physical properties from other materials used in the making of plastic pipe. It produces pipe—and many other plastic products—that are both hard and tough, low in weight, high in tensile strength and unaffected by most chemicals that corrode metals.

Pipe extruded of KRALASTIC has been approved by the National Sanitation Foundation for underground water transmission lines. Because of the inert nature of KRALASTIC, this pipe will not add taste or odor to drinking water and will not corrode and scale internally to cut down flow and pressure. For more information on KRALASTIC, write or phone us.

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Naugatuck, Connecticut

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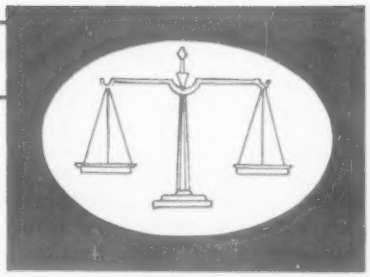

FPC reverses policy on importation of foreign gas

CONSUMERS, gas utilities and investors will be encouraged by the news that the Federal Power Commission recently reversed its 1954 ruling in the Pacific Northwest case that it would not be in the public interest to authorize the importation of foreign natural gas as the sole source of supply for a major area in the United States. FPC, with three new commissioners participating in a unanimous decision, asserted in the Midwestern-Tennessee Gas-Iron Ranges Natural Gas companies cases that the former ruling should not stand, and that "It is possible to envisage circumstances under which a project relying wholly upon Canadian gas could be found to be in the public interest, depending on the particular facts of a given case."

United States must become gas importer

Even with its great volume of known recoverable natural gas reserves exceeding 223 trillion cu ft, the United States has an inadequate supply to meet the demand. Despite extensive exploration and development of oil and gas in this nation, there has been a disturbing decline in the probable life of our remaining natural gas supply. In 1945 the United States had about 148 trillion cu ft of recoverable natural gas and the production that year was nearly 5 trillion cu ft. The indicated remaining gas supply then was approximately 30 years. In the short period since that time the proved gas reserves have increased to more than 223 trillion cu ft, but the production during 1955 was over 10 trillion cu ft, which leaves a remaining gas supply for only approximately 22 years.

It is imperative that natural gas be imported from Canada and Mexico to meet the requirements of 168 million people in the United States.

Canada is the most likely source for importation of large volumes of natural gas with its major discoveries and development in the Western Provinces. Investors, who are also consumers of natural gas in the United States, have dedicated multi-millions of dollars in searching for gas and oil in Canada. Since Canada's population is about equal to California's, the market for the vast gas reserves will be the United States. Of course, Canada's needs will be satisfied from its gas resources first, but it is good news that the former FPC myopic trade barrier to importation has been removed.

The law of supply and demand cannot be repealed by any government. The more scarce natural gas becomes, the higher the price becomes for it. In the past, when natural gas was plentiful, its price was lower than it is today. Given an economically feasible consumer price natural gas will flow to market. This law of supply and demand has defied man's efforts to suspend it or ignore it in the past.

FPC fosters international good will

Today FPC promotes good will with Canada. In 1954, however, when FPC certificated the United States pipeline from the San Juan basin to the cities in the Pacific Northwest and rejected a Canadian pipeline to supply natural gas to the same region it offended Canada. In that Pacific Northwest case FPC stated that:

"The Pacific Northwest is the one remaining large area of this country with a great need for natural gas but which is still without this highly desirable fuel and raw material. It is a section where great industrial expansion has occurred and is still in progress, and one which has played and continues to occupy a very important role in the national defense. The record amply demonstrates that it has a real desire and need for natural gas.

"The Natural Gas Act imposes upon this commission the duty to protect the American public in all possible respects through the regulation and control of the transmission and wholesale sale of natural gas. It is most essential that the domestic consumers and much of the industry in any area into which natural gas is introduced be reasonably assured of a firm supply, so far as is possible through such regulation and control. We would fail in our duty if we did not jealously retain and

*A monthly commentary on national and state developments by an expert in the field of utility law.

Regulatory trends . . . FPC acted wisely in reversing import sentiments

exercise our full legal powers to this end. Therefore, in granting any application under Section 3 of the Act for the importation of natural gas, the commission must not fail to give the fullest possible protection to all the prospective consumers.

"Such protection would not be afforded to any segment of the American people if its sole source of essential natural gas were through importation from a foreign country without some intergovernmental agreement assuring the continued adequacy of its supply. Otherwise, all control over the production, allocation, and transportation to our border of such natural gas would be in the hands of agencies of foreign governments, whose primary interest would of necessity always be in the needs and advantages of their own people, and whose judgments and actions would be essentially dependent upon public opinion within that country, rather than upon the interests of American consumers. Regardless of any long and cherished friendly relations with any neighbor nation able to supply such area with natural gas, it would not be in the public interest to permit the importation of its gas as the sole source for the consumers in need of an uninterruptible supply at a reasonable price, which should always be assured by this commission to the full extent of its powers.

"In this Pacific Northwestern section of our country there are potential industrial consumers of natural gas whose needs will be great and who may well be supplied with imported gas on a supplementary or interruptible basis. In any area which is receiving from an American source a supply of gas sufficient for its firm needs, it is conceivable that there might be imported to it from a neighbor country upon satisfactory terms and conditions a supplementary supply of gas for its interruptible needs. We do not consider it to be in the public interest, however, to authorize a most important new project to serve a major area—involving a large and important segment of the American economy — which from the outset will be completely tied to and wholly dependent upon an exclusive source of supply entirely beyond the control of agencies of the United States."

Wise decision

With the remarkable history of friendly relations between Canada and the United States the present FPC has acted wisely in reversing the former decision concerning foreign gas. For many generations Canada and the United States have maintained a border 3000 miles long without one fortification, and with easy interchange of people and business. The statesmanship of the current commissioners is manifest from the following declaration, which was made late in 1956:

"One question of policy apparently needs clarification, however. It relates to the proposed design of Midwestern's projected line and to our position with respect to the importation of natural gas from outside the United States.

"The facilities of Midwestern's proposed pipeline would extend from a point on the Canadian border near Noyse, Minn., to a point of connection with Tennessee's system near Portland, Tenn. Through these facilities gas purchased from Trans-Canada Pipe Lines Ltd. would be transported south and gas purchased from Tennessee would be transported north, to serve midwestern markets. The movants contend that because this line would telescope to a 218-mile 16-in. central section running from Joliet, Ill., to Stevens Point, Wis., gas from the south could not be made available to Minnesota and Wisconsin communities north and west of Eau Clair, Wis. This, it is said, would be contrary to commission policy as set forth in Opinion No. 271, *In the Matter of Northwest Natural Gas Company*, Docket Nos. G-996, *et al.*, in which the commission expressed its disfavor of the dependency by a major area of this country for its supply on natural gas solely on imports from a foreign country.

"The examiner considered that, for a number of reasons, the *Northwest* opinion did not require dismissal of applicants' proposals. He noted that dismissal of the applications of Midwestern and Tennessee now would preclude their consideration along with the proposals of other companies which have in other dockets filed applications said to be competitive with those of these applicants. He pointed out that final conclusions respecting the supply and availability of Canadian gas, conclusions which could not be reached until the record in the proceedings is complete, might well have material bearing upon the suitability of applying the *Northwest* opinion to the circumstances of this case.

"Separate and apart from the considerations relied on by the examiner, we conclude that the *Northwest* opinion does not require the dismissal of applicants' proposals at this time. Without undertaking to pass upon what authorizations, if any, should issue in these proceedings, we conclude that the views expressed in the *Northwest* opinion disapproving of reliance in this country on Canadian gas as a sole source of supply should not be permitted to stand. Of course, the matters which come before the commission should be decided on the basis of their particular facts. It is possible to envisage circumstances under which a project relying wholly upon Canadian gas could be found to be in the public interest, depending on the particular facts of a given case. Accordingly, we cannot adhere to a rule which bans in advance all such projects, without reference or regard to the circumstances of particular cases which may come before us for decision."

Foreign commerce in natural gas will benefit the people in three nations in North America, so cheers to the present FPC. ■

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Pressures to 1200 p.s.i.

No-Blo® Steel Valve. For high pressure service lines. Machined from steel forging. Available with threaded or welding inlets and outlets. "O" rings around stem and in cap prevent leakage to the outside. Metal to metal line contact of stem and seat assures gas-tight shut-off. The No-Blo Steel Valve can be completely reconditioned under full line pressure without escape of gas by using the Mueller E-4 Drilling Machine and gate valve. Easily operated from above ground through curb box.

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Positive shut-offs are assured with precision ground key which is individually lapped into the stop body. This assures pressure tightness at the port and prevents leakage through the stop when closed. Key is firmly seated with spring pressure and line pressure. "O" ring seals at top and bottom of key prevent leakage to outside. Light down pressure on shut-off rod unseats key for easy turning. A wide selection of inlets and outlets will easily adapt it to any type of service line.

Contact your Mueller Representative or write direct for complete information.

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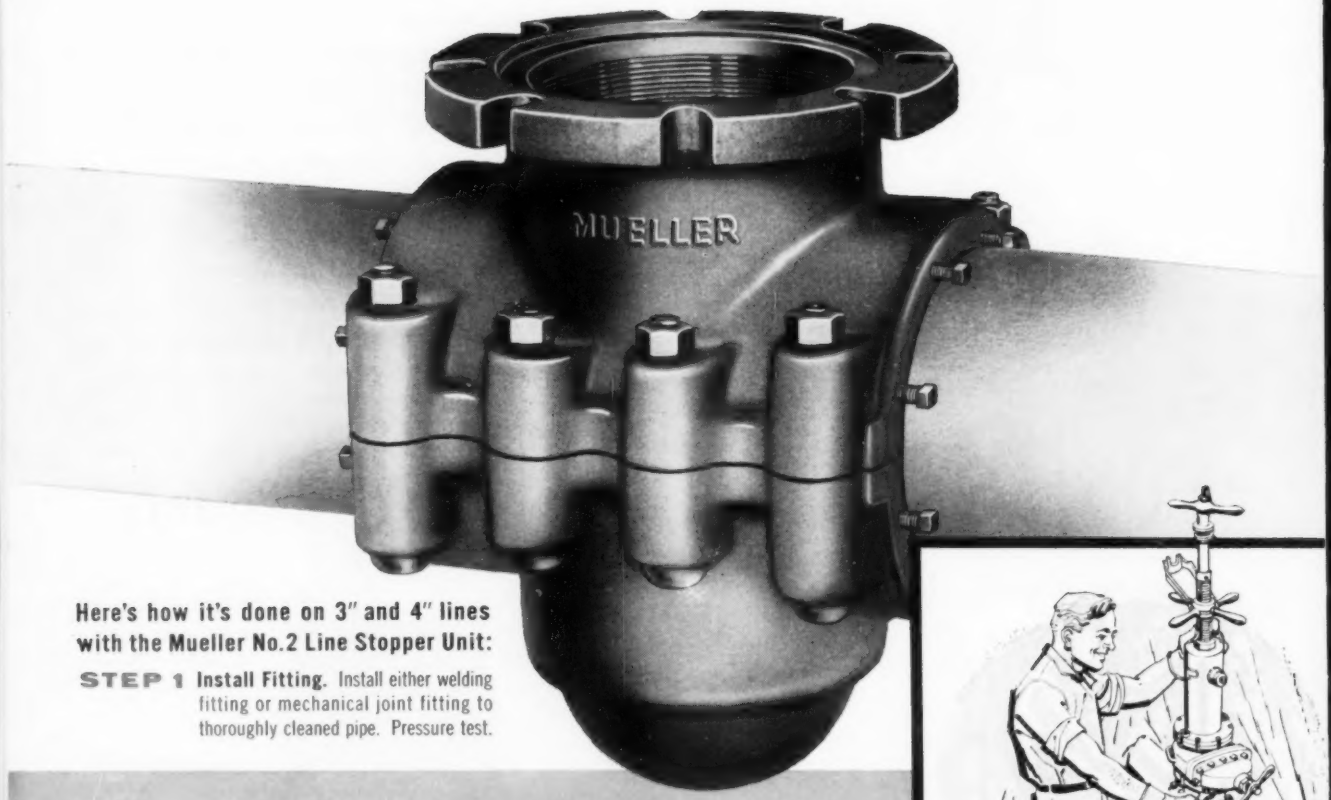
STOP-OFFS



Here's how it's done on 3" and 4" lines with the Mueller No.2 Line Stopper Unit:

STEP 1 **Install Fitting.** Install either welding fitting or mechanical joint fitting to thoroughly cleaned pipe. Pressure test.

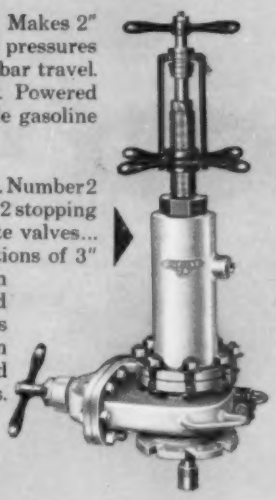
STEP 2

Alignment. Attach gate valve to flange of fitting. Open valve. Attach plug alignment tool to completion plug. Insert plug–check alignment and bolt down gate valve. Remove stopping machine and completion plug.

Machines required

C1-36 Drilling Machine. Makes 2" through 12" cuts–working pressures to 500 p.s.i. – 36" boring bar travel. Automatic feed indicator. Powered with air motor or portable gasoline engine drive unit.

H-17235 Stopping Machines. Number 2 unit comes complete with 2 stopping machines and 5" steel gate valves... to completely isolate sections of 3" and 4" steel or cast iron pipe. Machine inserts and expands rubber stoppers and deferred completion stoppers and inserts and removes completion plugs.



A choice of fittings

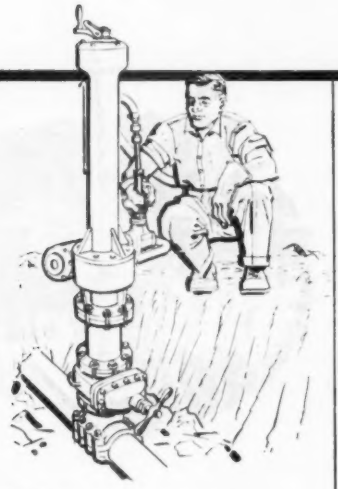
H-17255 Welding Line Stopper Fitting... for 3" and 4" steel pipe. Completion plug has "O" ring seal and equalizing valve. Maximum working pressure 230 p.s.i. Also available for pressures of 600, 800 or 1200 lbs.

without blowing of gas!

Those line sections that need repair or replacing can be stopped off without interruption of service with Mueller Line Stopper Units. Mueller Save-A-Valve Drilling Nipples may be used to quickly install an independent by-pass around the stop-off to carry full line flow, or you may use the built-in by-pass in the stopper units to carry a reduced flow. The entire stopping-off operation is accomplished under pressure and in complete safety with two Mueller Line Stopping Machines and a Mueller Drilling Machine.

Your Mueller Representative can provide complete information on the simple steps involved. Call on him or write direct.

MUELLER NO-BLO Method



STEP 3

Cut. Attach Mueller C1 36 Drilling Machine. Cut completely through pipe. Retract cutter. Close gate valve. Remove drilling machine.

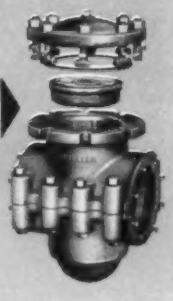
STEP 4

Stop-off. Fasten stopper to stopping machine. Bolt machine to gate valve. Open valve, lower stopper into fitting and expand it. Pipe is now stopped off and can be worked on safely. Service can be continued by by passing around stopped-off section.

STEP 5

Complete. Relax and retract stopper. Close valve. Remove machine. Detach stopper and attach completion plug. Replace machine. Open valve. Insert plug. Test. Remove machine and valve. Secure cap.

H-17266 Mechanical Joint Line Stopper Fitting...for 3" and 4" cast iron pipe. (H-17265 for steel pipe.) Completion plug has "O" ring seal and equalizing valve. Working pressures to 175 p.s.i.



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WASHINGTON

Lawmakers settling down to business at hand

By NEIL REGEIMBAL
GAS Washington Bureau

WASHINGTON is beginning to settle down to the serious business of thrashing out laws, making interminable speeches, probing, praising, and denouncing. It's a process which sometimes slows, but never quite stops.

As in most years, the lawmakers are starting out leisurely. Proposed legislation is piling up in the hoppers. Evidence is gradually being collected. It's the traditional easy start leading to a hectic finish where many worthwhile laws will die for lack of time.

Meanwhile, Washington is also still concerned about the economic effects of increasingly tight supplies of some types of materials, particularly steel. So is the gas industry.

After long consideration, and a number of heated debates in top council chambers, the Administration recently decided not to use its powers to allocate steel supplies for construction of new oil tankers. Effect of such an action, the White House reluctantly decided, would be to take steel and other materials away from other important industries, such as gas production and distribution.

At the same time, however, the government—again reluctantly—decided not to reopen its tax amortization goals to help spur construction of new steel capacity, and thus eventually ease the tight supply situation. The steel industry had asked for tax amortization to build some $2.3 billion worth of new capacity. The Office of Defense Mobilization turned them down.

As a result, the steel supply situation probably will not improve much for some time to come. Such items as pipe, of all but the smaller diameters, will be hard to get. Prices are going to go up on virtually all steel products. Steel plate will also remain fairly hard to get, as will structural steels.

Soft spots in boom may hit this year

Gas executives should beware of optimism concerning business in 1957. There are going to be some definite soft spots in the boom.

Government, business, and private economic forecasters all predict overall strong business in 1957. There is little to dent the optimism that nationally, production, wages, employment and sales will be as good or better than last year.

But everyone won't share in the boom, government economists warn. Some areas and some types of businesses will find themselves in a profitless prosperity.

Credit is one of the areas in which many utilities and business firms will find particular headaches. Federal Reserve Board chairman William M. Martin has made it clear there will be no easing in the board's tight money policies until inflationary pressures ease. This means that many gas firms will be pressed for funds for expansion, new equipment, and other capital requirements.

Homebuilding too appears destined to remain at a level of about 1.1 million new units this year, about 20 per cent below 1955's boom level. There will be government efforts to bolster the housing market, but without easier money conditions, they will probably be only moderately effective.

Rising costs of operating, for all segments of the gas industry, appear inevitable. Prices of steel and other metals and raw materials are going up. Wage rates are continuing to rise.

So while gas markets will continue to expand, the "squeeze" on operations will also continue.

ODM backs oil line to East Coast

Proposals to run a new oil pipeline from the Gulf producing areas to the East Coast will probably get a boost from the Office of Defense Mobilization. One of the proposals involves reconverting the Little Inch pipeline back to oil from natural gas.

ODM, right arm of the White House on defense planning, is panting for an oil pipeline connection from the major lines running through the Pittsburgh region to the East Coast. In case of war, an overland source of oil for the major eastern cities and ports would be a must, the agency figures.

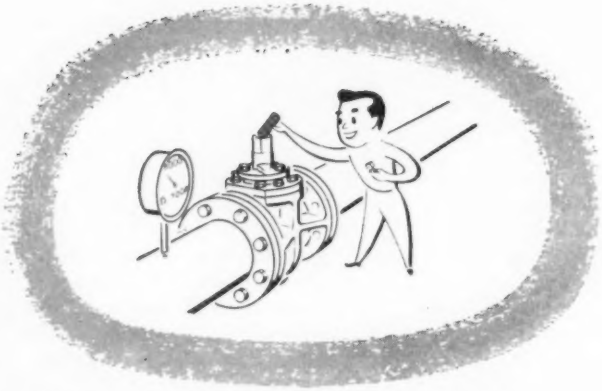
"We'd be willing to consider granting all the help possible if someone would build such a line," a top ODM official says.

Federal Power Commission, considering plans of Texas Eastern Transmission Corp. to reconvert the Little Inch and build more than $70 million in substitute gas facilities, asked ODM for its view. Texas Eastern is also proposing to build a new oil line to the East Coast to connect with the "inch" if conversion is permitted.

WHAT IS THE ADVANTAGE OF A LUBRICATED VALVE?—The most important advantage of a lubricated valve is that it *seals far tighter* than ordinary valves. The thin film of plastic lubricant forced into the ports of the plug is a pressure seal in itself. And the possibility of seizing or galling is eliminated because the plug can be hydraulically jacked for instant operation. Lubrication is also *preventive maintenance* against down time.

WHAT DOES THE LUBRICANT DO?—In a Rockwell-Nordstrom valve, lubricant is forced through grooves surrounding the plug ports where it acts as a *double seal* against leakage. By hydraulic action, lubricant under pressure also jacks up the plug keeping it free for *instant quarter-turn* operation. And lubrication means that operation is smooth and easy. Finally, lubricant prevents grinding wear for longer valve life at lowest cost.

DOES VALVE LUBRICATION ?



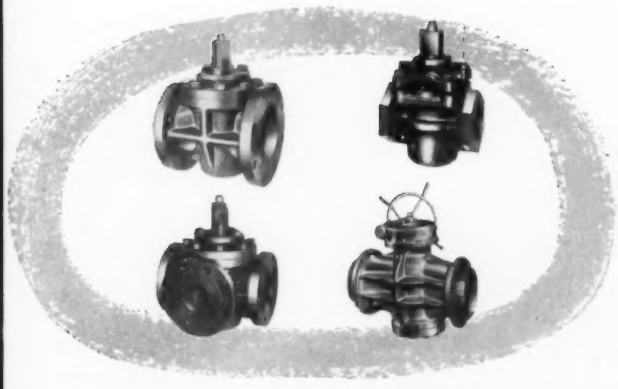
WHAT LUBRICANTS SHOULD BE USED?—Insist on genuine Rockwell lubricants—Rockwell is the largest and most experienced manufacturer of valve lubricants in the world. Rockwell lubricants are the result of years of field experience with nearly every process condition. For many services, there are variations of Rockwell lubricants compounded to offset specific line conditions. See your Rockwell sales engineer or write for Bulletin V-220 for complete details.

HOW LONG WILL PROPERLY LUBRICATED ROCKWELL-NORDSTROM VALVES LAST?—Many of the first Nordstrom valves put in service are still going strong. In gas distribution installations there are many valves with more than 30 years service. In a two-year paint plant study, Rockwell-Nordstrom valves were the only ones that did not need to be replaced because of leakage. Lubricant assures extra years of perfect service you can't expect from "dry" valves.

ROCKWELL

ROCKWELL-

LUBRICANT SEALED



WILL A ROCKWELL-NORDSTROM VALVE WORK WITHOUT LUBRICANT?—Yes, (even your automobile will function a short while without lubrication) but then the whole advantage of a lubricated valve is lost. Rockwell-Nordstrom lubricated plug valves are made to exceptional standards of tolerance and quality. However, it is their internal lubrication system which raises performance and economy standards far above any other type of valve.

HOW OFTEN SHOULD NORDSTROM VALVES BE LUBRICATED?—Basically, lubrication depends on service-temperature, process, frequency of operation, etc. Genuine Rockwell lubricants actually keep periodic lubrication to a minimum because they are specially compounded to handle specific services. Rockwell lubricant fittings of a button head type make the job fast, easy and every Rockwell-Nordstrom valve can be lubricated in service.

COST MONEY OR SAVE MONEY?

WHAT ABOUT MAINTENANCE COSTS?—Basically, lubrication is preventive maintenance against wear, replacement and down time costs. Also, lubrication—the key to leakproof, positive shut-off in Rockwell-Nordstrom valves—is an investment in safety and product loss or contamination. It's almost a mechanical axiom that *any* fully lubricated mechanism will require far less repair and parts replacement than a non-lubricated one.

YES, FOR 40 YEARS IT HAS BEEN PROVEN IN EVERY INDUSTRY THAT ROCKWELL–NORDSTROM LUBRICATED PLUG VALVES SAVE MAINTENANCE, REPAIR AND DOWN TIME DOLLARS. LUBRICATION IS AN INVESTMENT IN BETTER SERVICE, LONGER LIFE AND LOWER COST.*

**Note: *First cost of Rockwell-Nordstrom valves is about the same—often lower—than ordinary valves.*

Rockwell-Nordstrom valves are available in semi-steel, steel, stainless and corrosion resisting metals and in a *full range* of sizes and pressures. For complete details on Rockwell-Nordstrom valves or Rockwell lubricants, see your supplier or write: Rockwell Manufacturing Company, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.

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A simple expansible tube serves as both diaphragm and valve. It's the only moving part, and outlasts ordinary valve mechanisms many times over. Instantly responsive, it closes over scale or foreign matter without leakage or damage. Shown here are typical town border and distribution station installations. Grove *flexflos* are also proved for more effective service with air, water, oil, and special fluids. For more accurate control, longer trouble-free service, and lower maintenance, investigate Grove *flexflo*.

- Control within narrow limits to full capacity
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- No metal parts to chatter, slam or bang
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- For temperatures to 150 F, working pressures to 1500 psi
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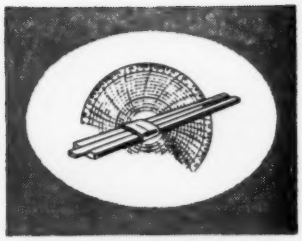


By GUY CORFIELD

We are doing something about the weather

A recent issue of Nation's Business stated that the U. S. is spending $50 million a year to change the weather, but that weather control could well be worth $4 billion in the near future.

Present expenditures, beyond rain making, which is practiced over approximately 350,000 square miles, and formation of snow pack on watersheds providing hydroelectric power, involve such activities as forest fire and flood control, frost prevention, and fog dispersal. Additional and more specifically directed controls, even including diversion or breaking up of hurricanes, are expected to result from the federal government's annual research budget of some $7.5 million administered by the President's Advisory Committee, the Weather Bureau, the Forest Service and the Armed Forces.

The control of weather, however, is introducing many perplexing social and particularly legal problems: Should weather control be a monopoly of government, and if so at the state or federal level; or should industry or individual manipulation be permitted under general rules and supervision? Who has ownership of the air and the rain clouds that form and pass through it? Who is to blame if beneficial rain in one area does damage to adjacent property? What is the status of insurance policies protecting against weather damage, written in terms of "acts of God," when such damage is caused by human effort?

Thirteen states have enacted weather laws since 1951, 10 of which actually regulate weather control to some degree. Arizona regulates the manufacture and sale of weather control equipment, and general operations, but exercises no control over individuals attempting to improve weather over their own lands. Colorado requires weather makers to prove their proficiency and obtain a license. Massachusetts makes all weather control a public function subject to public hearings and certificates of authority. Oregon requires that weather operators be able to pay up to $100,000 for personal injury or property damage. South Dakota levies a special tax for weather control if 51 per cent of the property owners of any county vote in favor of it. Wyoming requires weather moderators to register annually, and specifically exempts the state from any damage liability.

It would seem that the gas dispatcher will now be confronted with one more variable in his effort to forecast gas load in terms of weather predictions.

All-year air conditioning

One of the objectives of air conditioning engineers is to develop a single system of air ducts, for residential use, that will be suitable for both winter heating and summer cooling. As one of the domestic gas research projects under the AGA PAR plan, an investigation has been in progress at the Engineering Experiment Station of the University of Illinois, exploring the warm and cold air distribution in a room from outlets at floor, baseboard and sidewall locations. The results have been published in a University of Illinois bulletin titled "Distribution of Air Within a Room for Year-Round Air Conditioning—Part 1," and the major conclusions are as follows:

1. No single type of outlet provided optimum air distribution for year-round air conditioning.
2. During heating the most acceptable distribution was obtained from outlets which were located in or near the floor and directed the air horizontally across the floor, or which directed the air vertically with considerable spread. The latter type gave acceptable performance over a wide range of flow rates and supply air velocities.
3. During cooling the most acceptable distribution was obtained from outlets which were located near the ceiling and discharged the air horizontally, or from outlets located in or near the floor which directed the air vertically with little spread.
4. The preferred (producing most acceptable distribution) outlet for one season will only be a compromise for the other season.
5. During heating or cooling if an outlet produced uniform temperature distribution with little stratification, the location of the return intake has only a limited effect on the distribution. Under these conditions, the performance of a system with a single return intake would be practically the same as for a multiple-return system, but the installation would be greatly simplified.

Additional studies, dealing with outlets at several other locations, multiple outlets, and a divided room, will be reported in a later bulletin. This first bulletin may be obtained from AGA at a cost of 75 cents.

WHY

Repair? . . . or Replace?

GAMBLE

WITH OBSOLETE METERS?

When to retire old gas meters is not a matter of "7 come 11." It's a matter of economics!

For example, after X years your old meters will cost too much to repair . . . will lose revenue or become "DR's" in service.

It follows that after X years the time has come to scrap them.

There are several schools of thought on how many years is X years. But on one thing all informed operating and management men agree. It's agreement on the principle of *planned meter retirement.* They know that the continued use of over-age meters is an unprofitable gamble.

Investigate for yourself the advantages of a carefully planned program of meter replacement. Learn how it will help you improve measurement, increase revenue and cut meter maintenance costs.

And learn why new Rockwell aluminum meters by up-grading your measurement standards will prove to be a money-making investment.

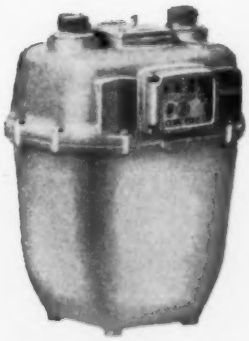
ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. Atlanta Boston Charlotte Chicago Dallas Denver Houston Los Angeles Midland, Texas New Orleans New York N. Kansas City Philadelphia Pittsburgh San Francisco Seattle Shreveport Tulsa In Canada: Rockwell Manufacturing Company of Canada, Ltd., Toronto, Ontario

Be sure and see playhouse 90, A. G. A. sponsored TV program . . . Check your local paper for time and station.

UPGRADE YOUR MEASUREMENT WITH ROCKWELL ALUMINUM METERS

No. 150



No. 250

No. 310

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There's Safety in Odor... when it can't be overlooked !

Nature endowed the skunk with a foolproof protective device—an instantly available odor that can't be mistaken nor overlooked.

SHARPLES HAS EQUIPPED ITS ODORANT

SPOTLEAK® 1009

with the same kind of a never-to-be-forgotten "aroma" that offers pipeline companies and natural gas distributors these superior advantages over other odorants:

- **80% minimum tertiary butyl mercaptan in every drop of Spotleak 1009.**
- **greatest possible uniformity and stability at the lowest price for a quality odorant.**
- **less oxidation loss, assuring more odorant AT THE END OF THE LINE!**
- **highest perceptible and warning level of mercaptans, assuring definite protection.**

Don't compromise with the protection of your natural gas customers. Try out SPOTLEAK 1009 and you'll see what safe, low cost odorization really means! Our descriptive literature gives you the facts you'll want.

'SHARPLES' brand CHEMICALS... products of

INDUSTRIAL DIVISION, PENNSYLVANIA SALT MFG. CO.

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Pennsalt Chemicals

Need specialized help in any of these directions?

The modern approach to solving special operating problems is to call in specialized help. That way you don't divert your own key personnel from regular duties. You don't overburden your regular staff. And you save a maximum of payroll dollars. Backed by long experience in solving similar problems for gas companies throughout the United States and abroad, Ebasco gets to work promptly, gets the job done right and economically while your normal flow of routine operations continues.

Ebasco technicians are at your call anywhere and anytime you need them, for assignments large or small in any phase of manufactured or natural gas operations.

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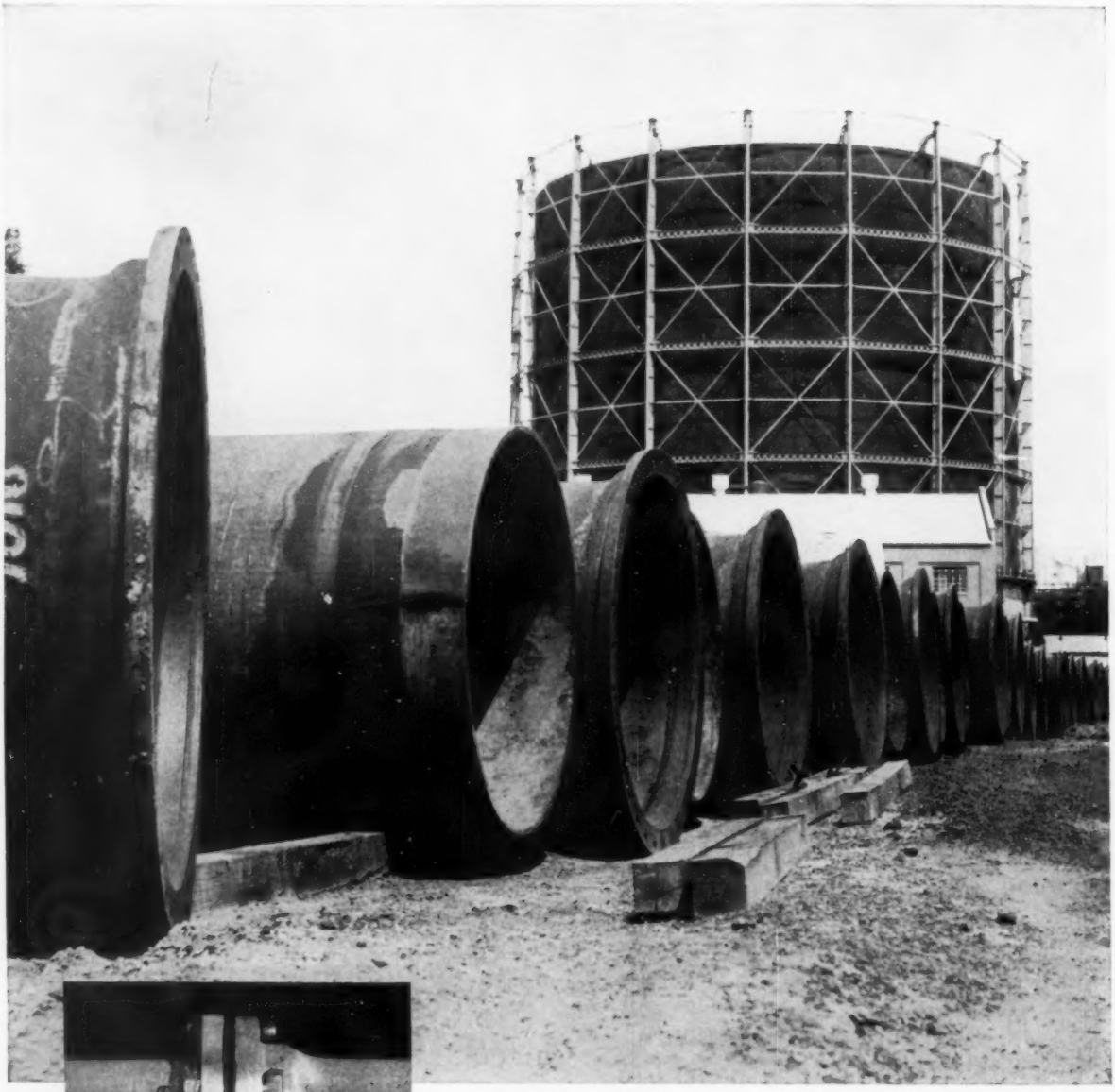
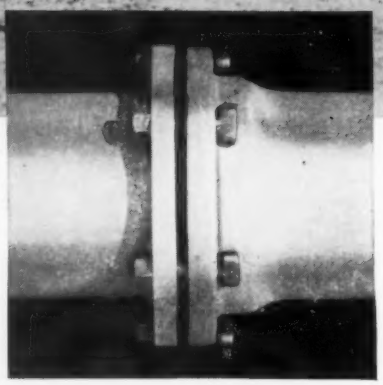
In addition to assisting with operating problems, Ebasco offers a complete engineering and construction service for building new facilities or additions to present installations—from initial planning to actual operation of the plant or pipeline. A half century of experience in the gas industry stands behind this service.

For a complete outline of the services Ebasco offers, write for our booklet, "The Inside Story of Outside Help." Address: Ebasco Services Incorporated, Dept. F, Two Rector St., New York 6, N.Y.

HERE'S DEPENDABILITY





Large diameter Mechanical Joint cast iron pipe to be installed for feeder mains in gas distribution system at Indianapolis, Ind.

CAST IRON

Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 122 So. Michigan Ave., Chicago 3, Ill.

MECHANICAL JOINT **cast iron**

THAT CAN BE PROVED!

No other pipe can point to so outstanding a record!

THE DEPENDABILITY OF CAST IRON GAS MAINS RESTS ON PROOF!

LOOK AT THE RECORD:

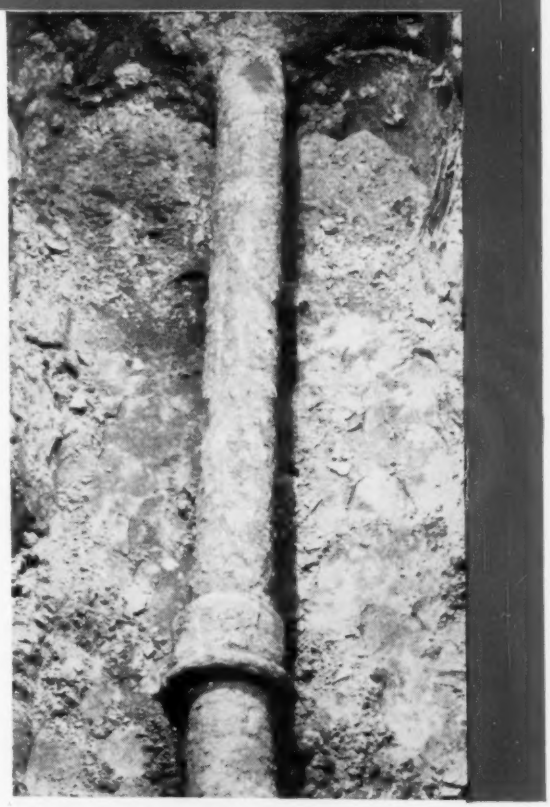
Cast iron gas mains have been used for years by many of America's most important gas companies. Of these, 40 companies installed their mains a century or more ago. They are still in service!

Modernized cast iron pipe, centrifugally cast, is even tougher, stronger, more efficient. Its standardized mechanical joints are bottle-tight under all gas pressures . . . and for all types of gas.

Wall thicknesses are uniform. Joint design allows deflection during and after installation. Service lengths and ample variety of standard fittings cut time and labor in congested undergrounds.

Equally important is availability. No periodic shortages hamper your installation plans.

Specify cast iron pipe for your distribution mains and you can count on performance. Performance based on proof!



Working Hard Since 1848!

109 years ago the Savannah Gas Company installed this cast iron gas main. Recently uncovered, it was found to be functioning efficiently.

Such longevity, rare with most products, is common with cast iron pipe. And modernized cast iron pipe is even more rugged.

A FEW OF THE 40 GAS UTILITIES WITH CENTURY-OLD CAST IRON MAINS IN SERVICE

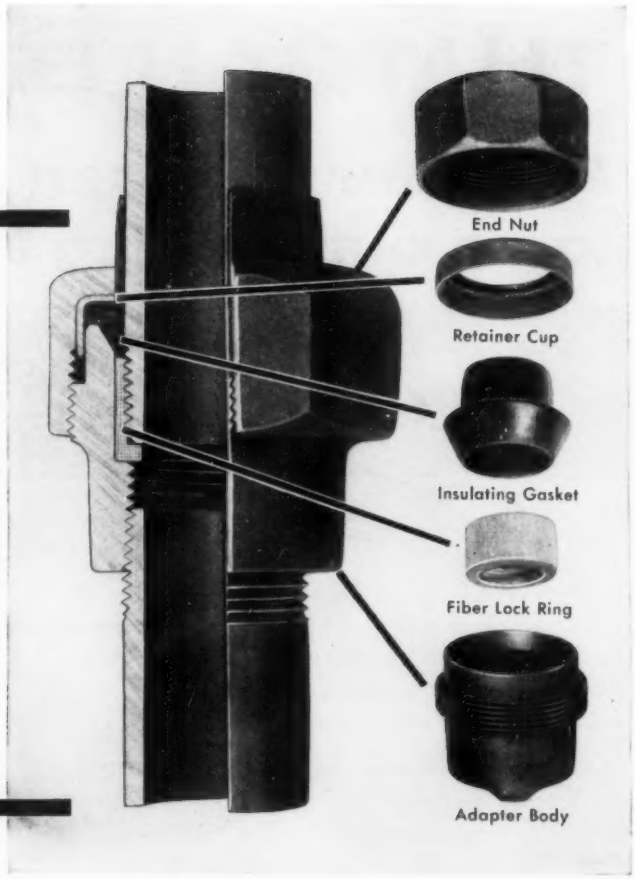
Peoples Gas Light and Coke Co., Chicago — Consolidated Gas Electric Light and Coke Co., Baltimore—Philadelphia Gas Works—Richmond Gas Works, Richmond, Va. — Hartford Gas Company, Hartford, Conn.

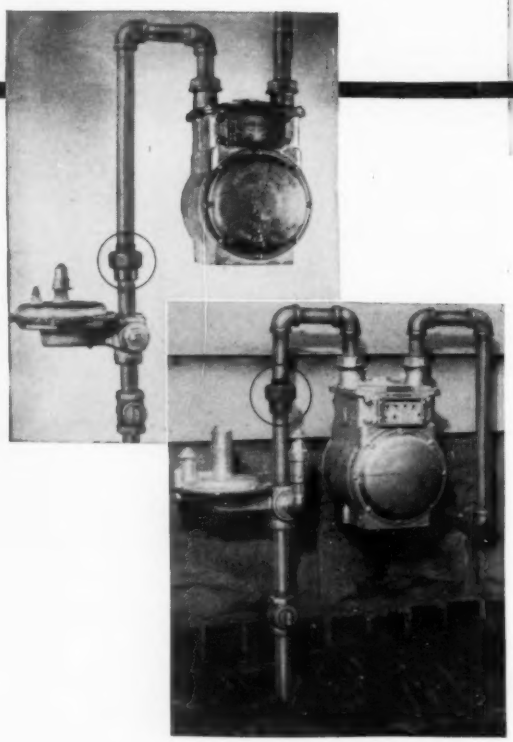
pipe FOR MODERN GAS DISTRIBUTION

INSULOK

ADAPTER

seals gastight, resists pull-out, blocks current flow!





Since its introduction, the Dresser Style 90 Insulok* Adapter has become accepted throughout the gas industry for setting meters and regulators—inside the basement and out!

Installation is fast, foolproof, trouble-free. Positive sealing is maintained by the rubber gasket *built in.* To meet the unusual strains of basement hookups, the fitting design provides extra safety and resistance to pull-out. Rigidity for good meter settings is assured. Damaging currents between main and house are blocked effectively.

Insulok fittings are available for a variety of applications, in ¾", 1", and **1¼"** sizes, in both male and female types. Wrench-installed like all other Dresser products, they go on quickly and easily, provide swift entrance into lines for servicing of meters and regulators, assure leakproof performance for life. Your Dresser Sales Engineer will give you full details.

*Insulok is a registered trade-mark.

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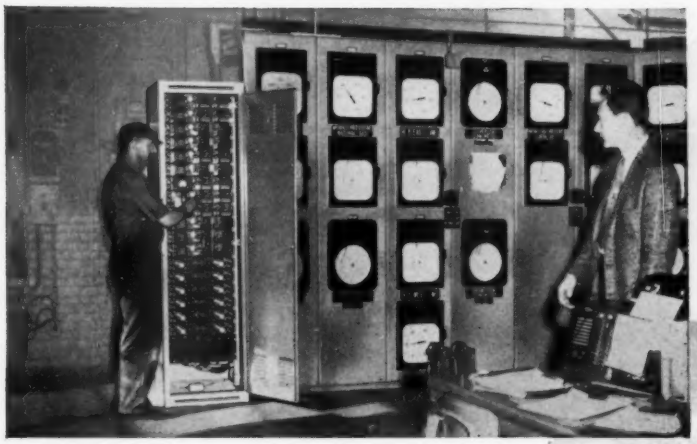
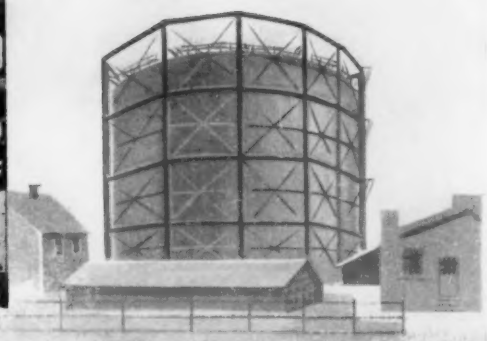
Dresser Manufacturing Division, 59 Fisher Ave., Bradford, Pa. Warehouses: 1121 Rothwell St., Houston; 101 S. Airport Blvd., S. San Francisco. Sales Offices also in: New York, Philadelphia, Chicago, Atlanta, Denver. In Canada: Toronto, Calgary.

COC® CUTS COSTS





Elizabethtown Consolidated Gas Company installs Hammarlund COC

AND SAVES $7092 PLUS/YEAR!

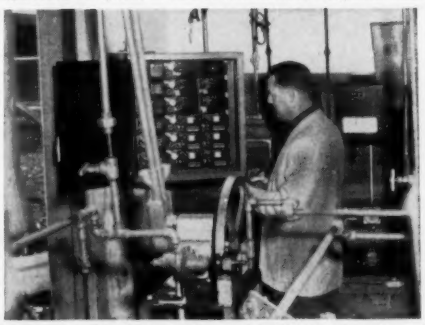
Another installation proves COC cuts costs. A saving of $7092 per year was realized immediately upon installation of Hammarlund COC equipment by Elizabethtown Gas (New Jersey) as a result of cutting telephone line rentals from 27 pair to three pair. And this is only part of the story . . .

Hammarlund COC equipment has permitted Elizabethtown Gas to expand their remote supervisory system without the need of additional telephone lines. These additional services will result in savings equal or surpassing the initial savings of $7092 per year.

Hammarlund COC (Centralized Operations Control) is audio tone signalling equipment that permits remote telemetering and control over ordinary telephone lines. The immediate and obvious advantage of the equipment is the ability to transmit up to 25 various functions simultaneously over a single telephone pair, thereby cutting telephone line rental to a fraction of the usual costs.

● **WE CAN POSITIVELY PROVE COC CAN CUT COSTS IN YOUR SYSTEM. LET US KNOW WHERE AND WHEN YOU WANT A DEMONSTRATION . . .**

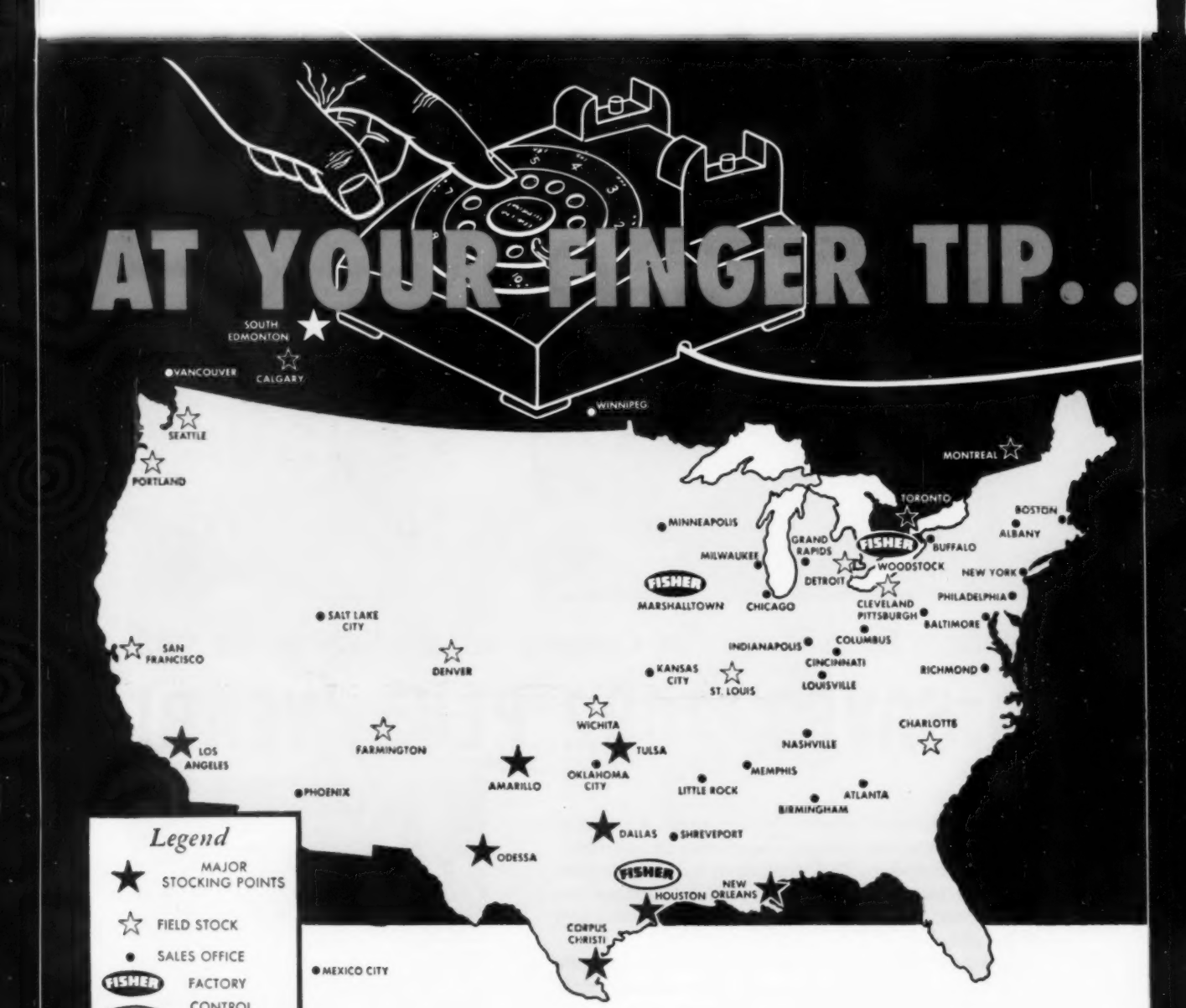
Control room of Elizabethtown Gas System. Complete remote supervision of system is carried over ordinary telephone lines.



A remote station in the system. Hammarlund COC equipment is amazingly simple, permitting complete field maintenance by personnel.

HAMMARLUND

HAMMARLUND MANUFACTURING COMPANY, INC., 460 West 34th Street, New York, N. Y.



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Accuracy

THAT BEHAVES AS IT SHOULD

Tomorrow's profits rest in the hands of the gas meters you buy today. That's the "credo" of Superior design and manufacture . . . to profit for you in three ways:

First . . . through unfailing accuracy, to protect public confidence in your services . . . at the same time protecting those services by preventing losses in the revenue needed to maintain them.

Second . . . to reduce repair costs. Superior concentrates on the little details that keep vital parts working years longer without replacement . . . details that save valuable minutes in the shop . . . details that help you get Superior meters OK'd and back on the job without fuss or delay.

And third . . . to protect you from premature obsolescence . . . by building meters that last longer . . . and by a firm policy of always making repair parts available for Superior meters . . . no matter how old.

Send for Bulletin No. 1100

What more could you ask of a quality meter? Ask it all of Superior . . . with confidence . . . next time you buy.

superior
GAS METERS

SUPERIOR METER COMPANY, INC.

19 West 50th St., New York 20, N. Y.

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What kind of pipe do you need? Seamless—pressure pipe—welded pipe? You'll find that one call can get you "*Faster-from-Foster*" deliveries from one of the largest pipe warehouse stocks in the country. Try us for all sizes, ⅛" thru 30", all wall thicknesses—and try us for the unusual or the hard-to-get items in tested, structural grade, carbon, alloy, or aluminum pipe, valves, fittings. Try your nearest Foster office today—Call or wire.

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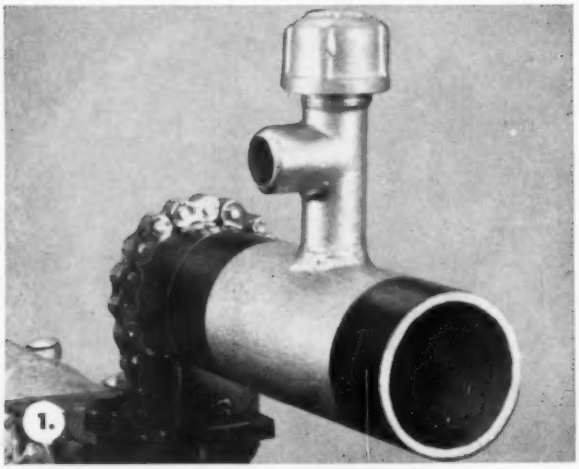
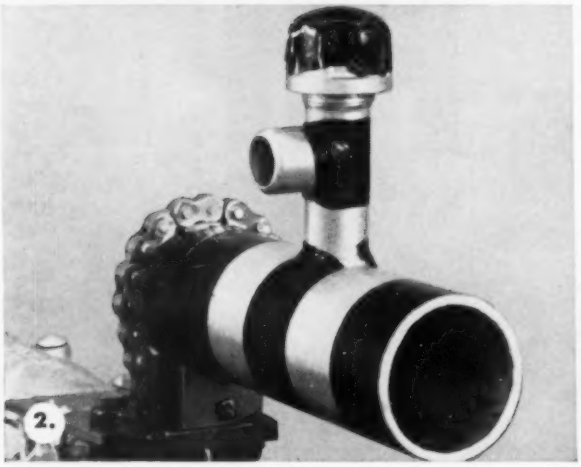
The tape that fits to a "T"



A remarkable ability to conform to irregularly shaped contours . . . plus all the advantages of polyethylene

Three easy steps in wrapping a T-joint with *Polyken* Polyethylene Tape No. 940. Note the way this highly conformable tape adapts itself to every twist and turn.



If you have pipe contour problems, this one's for you. Where you need it, it's a valuable new companion product to *Polyken* No. 900 polyethylene tape coating—the ideal coating for straight-pipe runs.

***Polyken* No. 940**—is made especially for use on valves, fittings, ells, T-joints and other irregularly shaped pipe connections. All the superb corrosion resistance of polyethylene . . . plus an extremely high degree of conformability.

No. 940 is a truly balanced product which offers the right combination of elastic memory and dead stretch. Financially, it can mean a nice saving on maintenance.

We'll be glad to figure application costs on your job. Write, wire or phone today: The Kendall Company, Polyken Sales Division, Dept. G-B, 309 W. Jackson Blvd., Chicago 6, Illinois (WEbster 9-7100).

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Rectangular Port Venturi

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ALL TYPES OF PORT OPENINGS

Homestead Cam-Seald Tapered Plug Valve Positive Metal to Metal Seal

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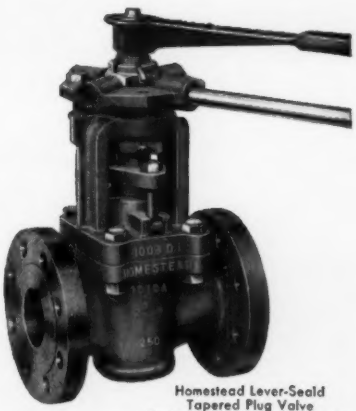
Name the type of valve you need in the metal or alloy you require with the port opening you want—and we can furnish it. Or if you have a valve problem that defies solution, write us, naming the fluid, concentration, temperature, pressure, valve size, function and frequency of operation. We will be happy to recommend the best and most economical valve for your service conditions.

For complete information on Homestead Plug Valves



Homestead Lever-Seald Tapered Plug Valve Positive Seal Without Lubrication

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The completely new Forward Control 'Jeep' FC-150 – the first time a 4-wheel-drive Truck has so effectively combined maximum cargo capacity with exceptional maneuverability! New Forward Control design puts a 74" pickup box on an 81" wheelbase. And the FC-150 retains famous 'Jeep' ruggedness and versatility.

New maneuverability!

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The new look and feel of tomorrow! The FC-150's Safety-View Cab combines beauty with utility. Its new wrap-around windshield is the largest in the 5,000 GVW class. There's plenty of extra leg and head room. Here is new styling, comfort, convenience and safety all in today's most advanced 4-wheel-drive Truck.

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See 'Jeep' vehicles at your WILLYS dealer

At a huge new sports stadium in Minnesota...

"SCOTCHRAP" rolls on easy ...even in zero weather!

"Scotchrap" conforms smoothly, handles easily at high or low temperature — and the pressure-sensitive adhesive sticks tight, too — even at 0°-10°F!

Johnson, Drake & Piper, Inc., General Contractors on the new Metropolitan Sports Stadium near Minneapolis, Minnesota, prefer "Scotchrap" Brand Pipe Insulation for these reasons — and many more. You see, there's no danger when applying "Scotchrap". No special equipment is needed. Just roll it on, and corrosion is sealed out.

"Scotchrap" is a tough vinyl plastic tape that resists abrasion above or below ground, resists galvanic and electrolytic action, resists damage from oil, water, acids, alkalies, weathering and sunlight. *Make sure you get the tape with the green adhesive.*

Sold by the square in 1″, 2″, 4″, 6″ and 8″ widths — 100-foot rolls. Order a supply today!

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SCOTCHRAP Pipe Insulation

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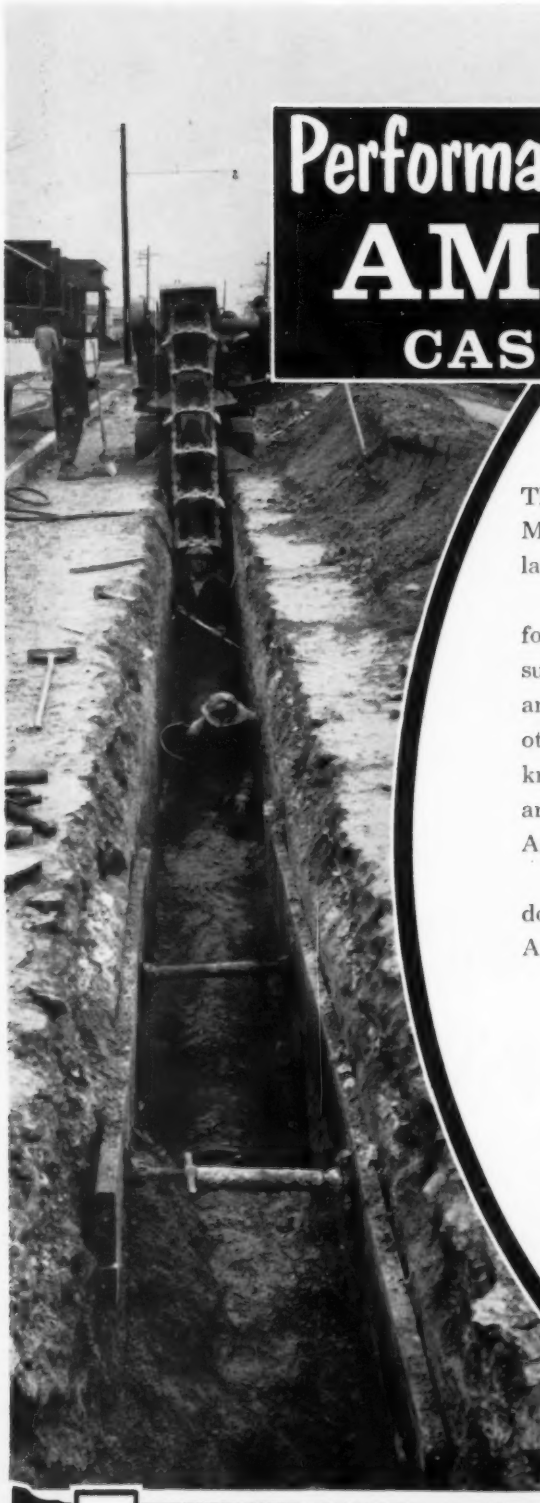


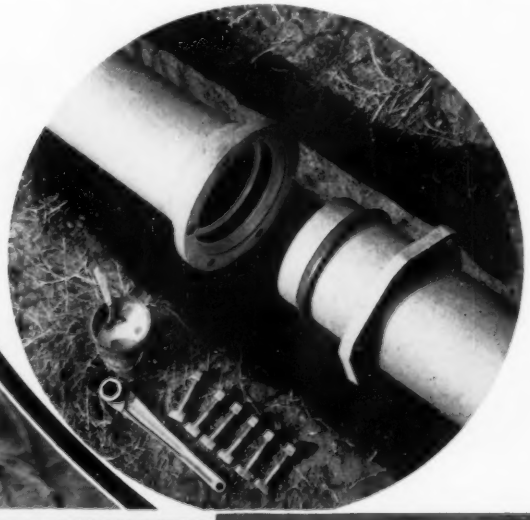
Performance... under pressure

AMERICAN
CAST IRON PIPE

The gas main being installed here is American Double-X Mechanical Joint Pipe . . . bottle-tight, rugged, longer-lasting cast iron pipe.

Because the Double-X Joint was specifically designed for gas service — engineered for performance under pressure — it has been the choice for thousands of municipal and industrial gas installations. In these, as well as in other utilities and industries, American Cast Iron Pipe is known for its record of dependable, trouble-free performance. Because its annual cost has proven to be lower, American Cast Iron Pipe is also known for its economy.

If you are under pressure to get the most for your pipe dollar, get all the facts about American Cast Iron Pipe. An experienced representative is as close as your phone.



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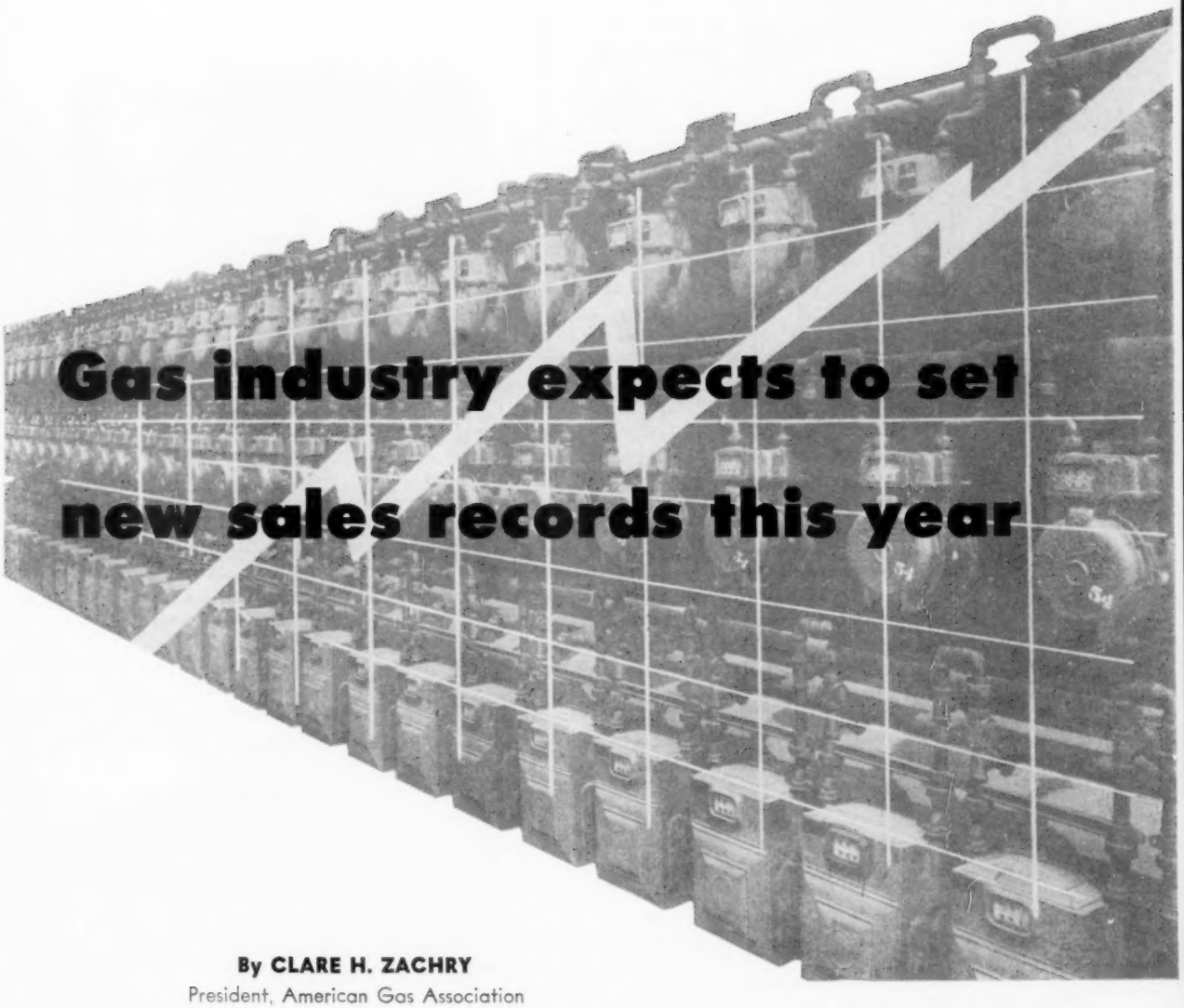


Gas industry expects to set new sales records this year

By CLARE H. ZACHRY
President, American Gas Association

THE gas utility and pipeline industry, now serving more than 30 million customers through half a million miles of gas mains in every state and the District of Columbia, continued its dynamic growth pattern during 1956 to reach record-breaking peaks. Even greater achievements in all phases of operation are confidently expected in 1957.

With revenues from utility sales now at an all-time high of nearly $4 billion, residential, commercial and industrial uses of gas are increasing steadily. Meanwhile, natural gas reserves have also reached unprecedented peaks.

Record-breaking expenditures of $1.65 billion during 1956 for new facilities to serve more customers reflected the dramatic progress of the industry. The gas industry currently has total assets of about $17.5 billion with the prospect of reaching $24 billion by 1960 for almost a quadruple gain in a decade and a half.

A major gas industry development during 1956 was the completion of the $230 million *Scenic Inch* pipeline from the Southwest to the border of Canada to bring natural gas to the Pacific Northwest for the first time. The last large region of the U. S. to receive natural gas, the Pacific Northwest is expected to make significant contributions to the gas industry's continued growth in the immediate

GAS

FEBRUARY 1957

future, meanwhile boosting its own industrial stature to new heights.

During 1956, the gas utility industry served an average of 29,602,300 customers, a new peak, including about 219,300 L.P. gas customers served directly by gas utility companies. This was a gain of 1,123,500 customers over 1955, when the industry was serving 28,478,800 residential, commercial industrial and other (such as armed forces and other government installations) customers. It is estimated that there are about 8 million customers served with L.P. gas in areas not on utility mains.

An average of 25,019,000 customers received natural gas during the year, a gain of 2,154,800 customers and an increase of 9.42 per cent over the 22,864,200 natural gas customers served during 1955.

Manufactured and mixed gas customers averaged 4,364,000 during 1956. Approximately 1.4 million former users of manufactured or mixed gas became natural gas customers during the year.

Total sales by the gas utility industry during 1956 reached 73.35 billion therms, a new record. This was a gain of 9.62 per cent over the 66.91 billion therms sold in 1955.

Natural gas sales achieved a new high of 69.9 billion therms, up 10.36 per cent over the 63.34 billion therms sold a year earlier. Manufactured and mixed gas sales totaled 3.37 billion therms.

Revenues from utility sales of gas achieved a new record total of $3948 million, a gain of 14.35 per cent over the previous record high of $3452 million established in 1955. Natural gas revenues increased 17.29 per cent to a total of $3483 million, also an all-time record. Manufactured and mixed gas revenues were $445 million compared with $463 million in the previous year. Gas industry revenues for 1957 are estimated at $4260 million.

Approximately 20,000 miles of gas mains were constructed in 1956 to bring the total mileage to 517,000.

Underground storage operations have also been increased substantially. At the start of 1956, there were 178 underground storage pools located in 19 states. The 6746 active storage wells in these pools had an ultimate capacity of 2.1 trillion cu ft.

An additional 10 pools under construction at the start of 1956 were estimated at a capacity of 81.7 billion cu ft of storage space for the underground storage of natural gas. With new gas house-heating customers to be added at an estimated rate of 1.3 million annually during the next few years, underground storage of gas becomes an increasingly important factor in stabilizing the gas load.

The gas industry spent $61 million on construction of underground storage facilities in 1956 and will spend $45 million on such facilities in 1957.

Proved recoverable reserves of natural gas at the beginning of 1956 were at a record high of 223.7 trillion cu ft, an increase of about 12 trillion cu ft over reserves at the start of 1955. These new reserves more than offset record net production of 10.1 trillion cu ft in 1955, up from 9.4 trillion cu ft the previous year.

The future

The gas industry will continue to grow on all fronts in 1957.

When the 30 millionth customer was added in mid-December, our industry could point to doubling its number of customers in less than two and a half decades. An average of 30.5 million customers will be served in 1957, with utilization of 77.6 billion therms of gas. By 1960, the prospect is for the sale of 92 billion therms, of which 32 billion therms will be residential sales. And in 1965, we should show aggregate sales of 116 billion therms, an increase of almost 73 per cent from the current level and nine times the figure of two decades ago.

The number of customers will continue to increase steadily to an estimated 33 million—31 million of whom will be residential customers—in 1960 and 38.25 million by 1965, including 35.3 million residential users.

With gas replacing oil as the leading heating fuel for U. S. homes, house-heating customers of gas utilities will jump from 16 million now to 21 million by 1960 and 27.5 million by 1965. Gas-heated homes represented about 46 per cent of the more than 49 million occupied homes and apartments in the U. S. as of mid-1956.

The industry's record construction expenditures of $1.65 billion during 1956 are expected to be surpassed in 1957 by an estimated 18 per cent. The AGA Bureau of Statistics forecasts 1957 expenditures at $1.954 billion. The gas industry's expenditures will be an important factor in the 2 per cent U. S. gain for private building construction predicted for 1957 by the U. S. Commerce and Labor departments. About 96 per cent of the gas industry's expenditures during the coming year will be for facilities of natural gas systems.

Expenditures between now and 1965 to meet the growing demand for gas service in all parts of the country will total about $19 billion, almost twice the amount spent in the previous 10 years and more than 20 times as great as the amount spent in the decade immediately preceding World War II.

Air conditioning

A field in which the gas industry is now focussing a major share of its effort is air conditioning. The AGA and manufacturers together spent $1.5 million in 1956 alone to develop gas air conditioners. Compact design and economy and reliability of operation are making gas air conditioning units a reality of today—not a dream of the future.

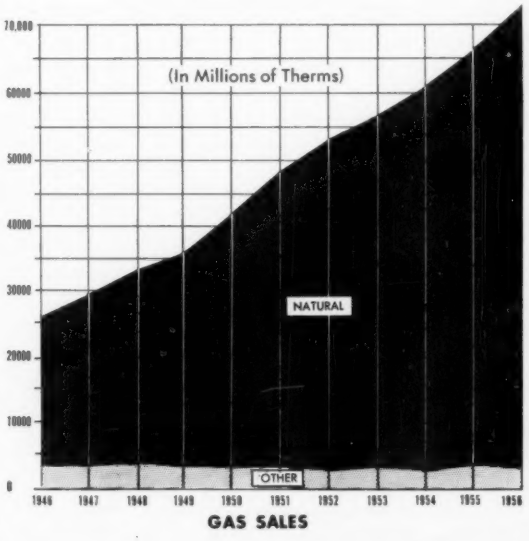
At least 10 reputable manufacturers are now in the gas air conditioning field—already producing units or developing field test units or conducting intensive research before starting production.

Surveys have shown a present market for a quarter of a million central air conditioning home units, a five-fold increase in air-conditioned manufacturing plants by 1980 as compared with 1953, and a constantly growing market in the commercial field.

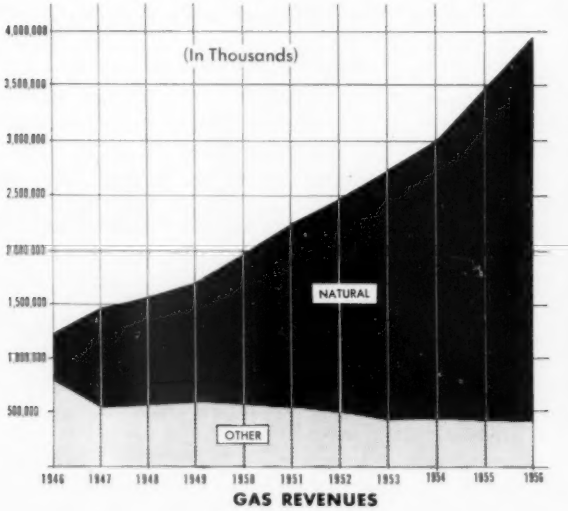
Gas air conditioning units for the home include exciting new developments in the field of year-round climate control by combined heating - cooling systems, which

Inventory of the Gas Industry

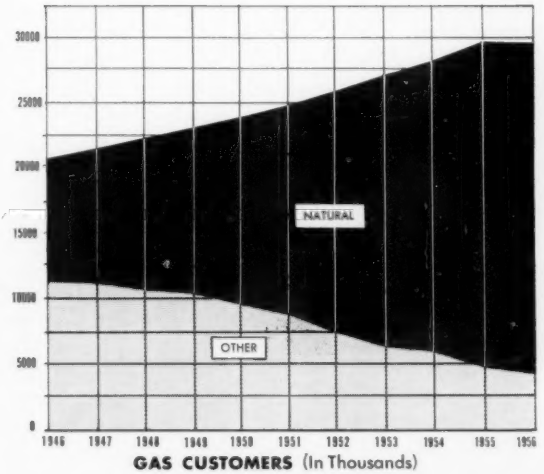
DECEMBER 31, 1956



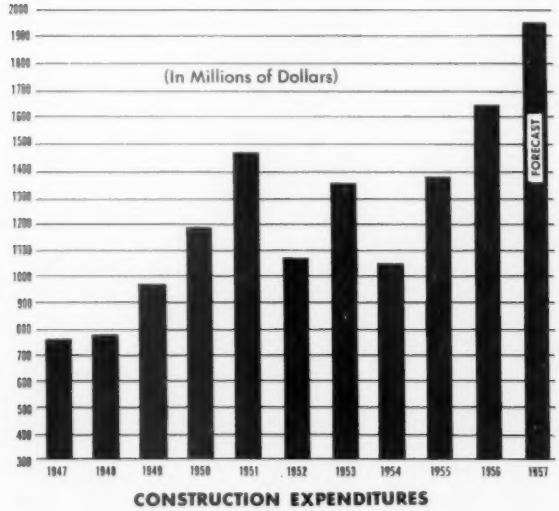
GAS SALES



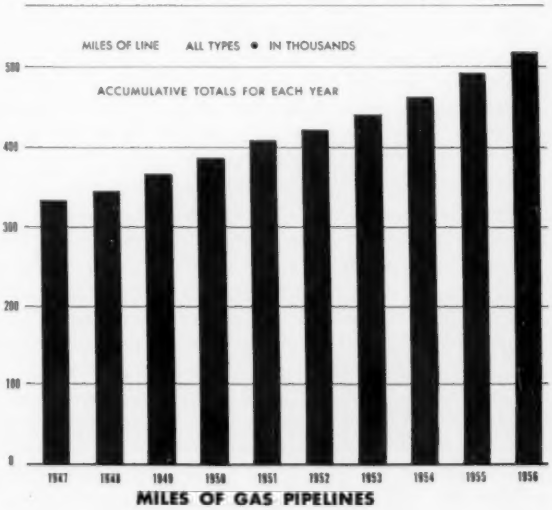
GAS REVENUES



GAS CUSTOMERS (In Thousands)



CONSTRUCTION EXPENDITURES



MILES OF GAS PIPELINES

will control humidity as well as temperature throughout the house. The gas industry recognizes that air conditioning is the "wave of the future" in the home and is going all out to meet it.

Other appliances

An all-time record of 2,837,000 automatic gas water heaters were shipped by manufacturers during 1956. This volume was accompanied by a marked upgrading in size and quality.

Exceeding 2 million units for the 10th straight year, shipments of free-standing gas ranges totaled 2,036,000. And this figure does not include approximately 160,000 built-ins, the popularity of which has been growing at such a fast pace that built-ins may provide 10 per cent of the gas range market in 1957.

Shipments of direct heating units climbed to 1.7 million for a gain of 15 per cent over 1955. This substantial increase more than offset small declines for wall heaters and floor furnaces, which totaled 301,000 units and 134,000 units, respectively, during 1956.

Automatic gas clothes dryers surged to 470,000 units, a gain of nearly 28 per cent over last year's 368,000. Makers of gas incinerators also enjoyed another good year and anticipate a continued increase in demand in the immediate future.

Boiler shipments also achieved a record high of 98,000 units, a gain of nearly 9 per cent above 1955. Warm air furnaces approximated 829,000 units, compared with record shipments of 835,000 in 1955. Conversion burner shipments aggregated 198,000 for a slight decrease from 209,100 the previous year.

A boom in home modernization and the growth of new markets helped gas appliance and equipment manufacturers achieve an impressive year despite a 15 per cent drop in new housing starts.

More than 90 million gas appliances now are used by residential customers of the gas industry. The outlook for the near future is very bright, with potential sales of 57 million additional appliances seen by 1960—and a staggering total of 300 million predicted by 1974.

The gas industry took an important step forward during 1956 when it completed arrangements for its first use of national network television. The program made its debut in January and was made possible by the unified efforts of gas utilities, transmission companies and manufacturers who subscribed more than $2.25 million in a common purpose for the good of the entire industry.

In addition to providing support for the new television show, utility and pipeline companies subscribed more than $3 million in 1956 to the Promotion, Advertising and Research (PAR) Plan, which completed its 12th successful year of coordinated activities embracing promotion, advertising, utility company research, pipeline research, and public information.

Testing

More than 5500 gas appliances and accessories were tested by AGA Laboratories for compliance with requirements and the privilege of displaying the laboratories approved seal or listing symbol. Many of these were advanced designs and the majority incorporated major improvements.

Central gas heating appliances, which accounted for about half of all appliances tested, featured compactness and eye-appeal design. Most of these appliances were also designed for operation at higher static pressure, so that they can be readily used with add-on cooling units for summer air conditioning.

Automatic top burner controls are available now on practically all ranges. Several manufacturers equipped ranges with an oven thermometer which operates to turn off the gas when food has been cooked to the exact degree desired.

Operational improvements were made in automatic gas clothes dryers, a number of which have increased their drying speed to insure the fact that gas continues to provide the fastest way of drying clothes.

The continuing high level of research activity promises continued industry progress in the appliance field. Twenty PAR-financed research projects, seven of them completed, are under study at the laboratories. Major emphasis in 1956 was on the development of domestic gas incinerators and commercial cooking equipment. Eleven research bulletins and reports were published, covering industrial and commercial gas research, and domestic gas utilization research.

The inspection program was accelerated by increasing unannounced visits to manufacturing plants and expansion of field tests. Eighteen revised appliance and accessory standards were adopted and 19 revised standards were submitted to the industry for study. Indication of the widespread interest in the gas industry's national standards was reflected in an all-time high for sales of requirement publications.

Growth is byword

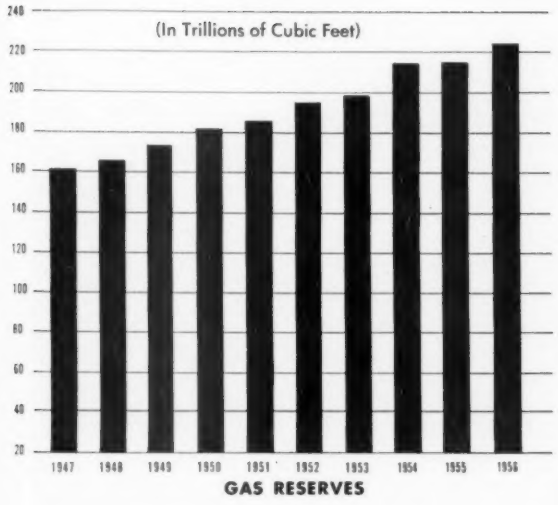
"Growth" is the byword of the gas utility and pipeline industry —today and for years to come. There is every reason for the greatest optimism regarding the prospects for many millions of additional satisfied customers of clean, economical, reliable, convenient gas service. The industry will continue to meet the needs of its residential, commercial and industrial customers for efficient, up-to-the-minute gas appliances and equipment.

Gas air conditioning, it should be emphasized, presents an enormous potential for our industry. Modern installations are already proving themselves — from shopping centers to factories, from homes to hotels and hospitals. Gas air conditioning must be regarded as an accomplishment of today, not a promise for tomorrow.

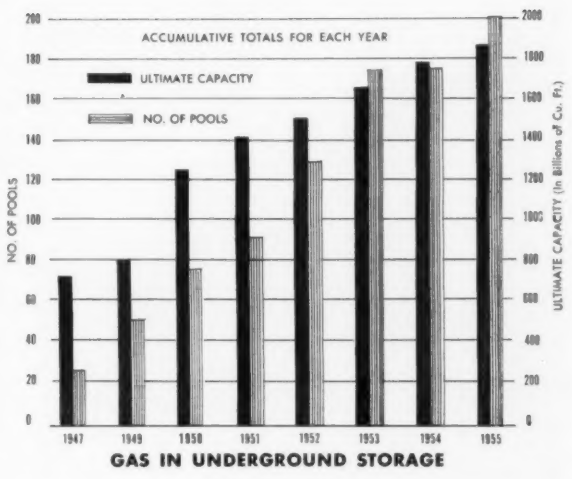
The growth picture of the gas industry can be seen in our outlook for net annual production of natural gas to 22.5 trillion cu ft by 1975 — more than double the 1955 net production. Meanwhile, natural gas reserves are expected to increase steadily, just as they have been doing year after year.

The gas industry will continue to provide the best service possible to more than 30 million present customers and to the millions of new customers to be added in the future. ■

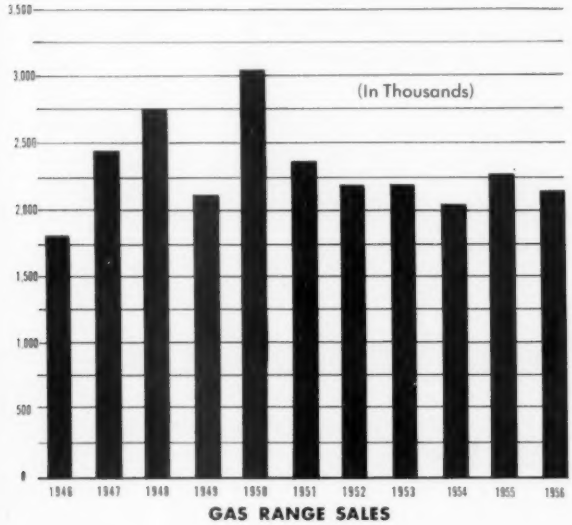
Inventory of the Gas Industry



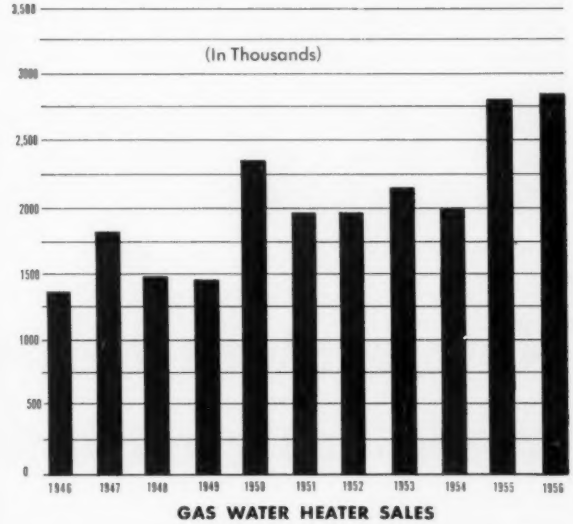
GAS RESERVES



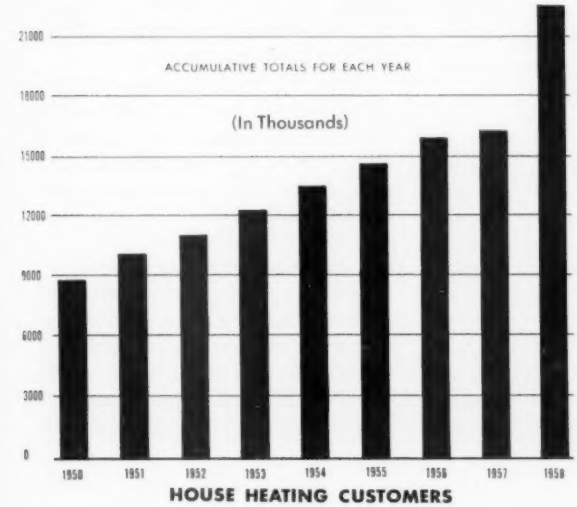
GAS IN UNDERGROUND STORAGE



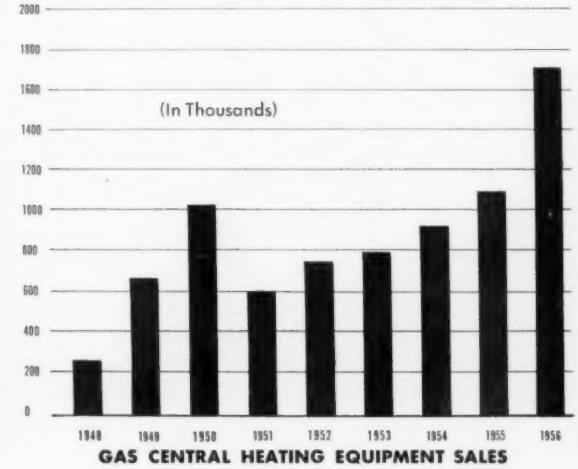
GAS RANGE SALES



GAS WATER HEATER SALES



HOUSE HEATING CUSTOMERS



GAS CENTRAL HEATING EQUIPMENT SALES

View of the Equitable Gas Co. showrooms in Pittsburgh.

New system helps Equitable Gas speed up customer service

This Pittsburgh utility has streamlined its accounting and record keeping. The paramount purpose was to provide more efficient service for its (230,000) customers.

EQUITABLE GAS CO. of Pittsburgh became an independent utility six years ago, but with the new independence came many problems of reorganization and readjustment. The rapidly expanding city of Pittsburgh had already overgrown previously established business methods, so a complete new system of accounting and control practices was instituted. The company called in specialists to help develop business systems that would match a growing community and at the same time promote good customer relations.

Today, the new offices, the modern business machines, the streamlined record systems and the fine employee relations at Equitable speak for themselves. Equitable's 230,000 customers, scattered over a 1000-square mile area, will vouch for the fact that from the standpoint of service the customer always receives prompt attention.

First step in the changeover was the establishment of a centralized customer service center. On one floor are located all departments dealing directly with the customer —ranging from the telephone switchboard to the meter test record and service dispatch division. This has not only made employees more familiar with the overall customer service operation, but has stimulated interest in the work and has simplified training routines.

The theme throughout the record

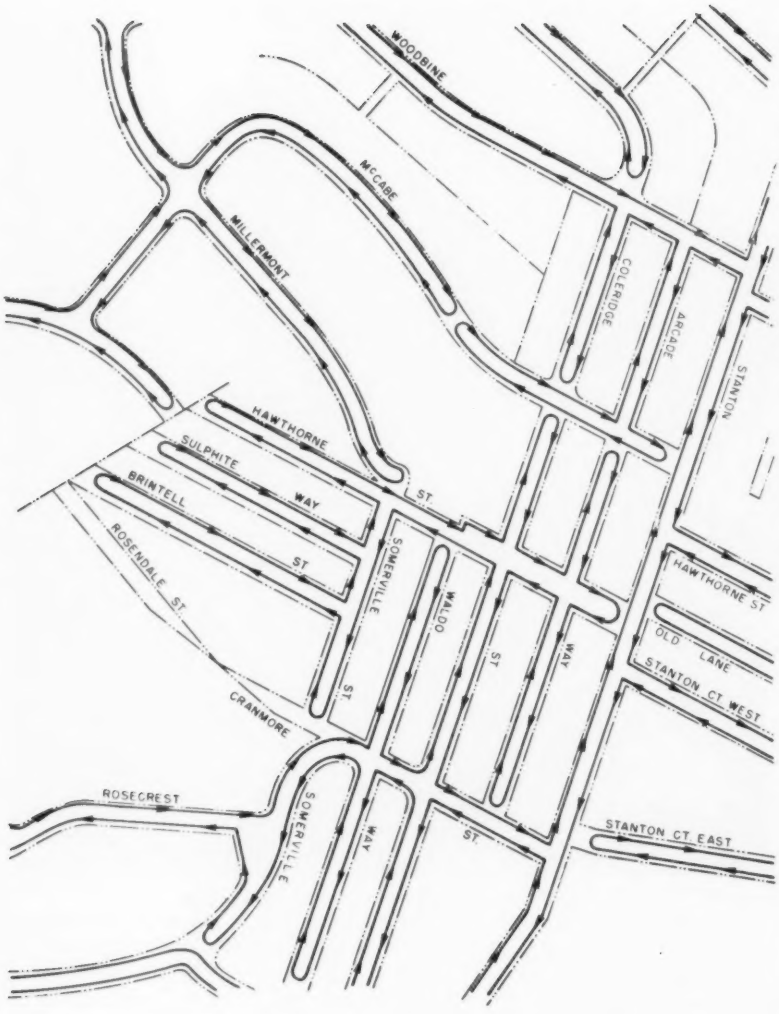


Fig. 1. Meter reading routes are arranged on a "continuous flow" basis.

system has been simplicity. Elimination of repeated rewriting and transcribing of information has cut office time appreciably. The customers' calls are routed quickly to the proper departments.

One of the most important phases of the "new look" was the redistricting of the entire area served by Equitable. This posed problems, for Pittsburgh is served by three separate gas companies. In some sections of the city, Equitable meters are widely scattered. Logical patterns of routes were extremely difficult to set up. Routing was further complicated by the fact that Pittsburgh has more streets than any other American city, and are not laid out systematically due to the hilly terrain and three large rivers which run through the city. Before the plan went into operation, there were 110 meter readers, each handling 21 routes—more than 2300 routes in all.

The redistricting was the result of careful analysis of territory characteristics, population growth and building trends in and around the city done by Remington Rand business system specialists. All 230,000 meter locations were mapped on a continuous flow basis (see *Fig. 1*). Each location was numbered consecutively except that sufficient numbers were allowed for growth between folios.

A systematic plan was used in establishing new meter routes, based on time factors, and taking into consideration the accessibility of meters, total numbers, classifications and distances. These factors were then adjusted for difficult terrain and anticipated growth. A scientifically evolved formula determined the number of meters one man could read in a day.

The territory now served is divided into 40 districts. A crew of 30 meter readers goes into each of two districts each day for 20 working days to complete the reading cycle. There are 1190 routes—each housed in a separate meter book. With each crew working on one given district each day, transportation is provided with route cars. These cars and the station wagons of the two outside groups are used to drop off and pick up readers on the way to and from outlying sections of the districts.

The continuous flow line system now used for numbering meter locations sometimes goes up one side of a street and down the other. In some cases it zig-zags and at other times it may go up one side and not return until much later in the route. At all times, however, this line remains unbroken through the entire territory served by Equitable. This system also enables call-backs to be made conveniently without loss of time.

Meter sheets are housed in meter-reading books and kept in desks in the bookkeeping department. Each day the unit bookkeepers pick out the books for the routes to be read and send them to the meter-reading department. Here the books are arranged in the left side of a wall rack *(Fig. 2)* which has been indexed with the names of the meter readers.

Each reader transfers the meter book read the previous day from a bakelite meter book cover to the standard canvas cover. He then files the book in the right side of the wall rack according to the terminal digit of the route number. He picks up his new book each morning and is out of the office with no loss of time.

Another innovation started by the company is a drive to encourage customers who are not regularly at home to make their keys available to be kept on file at the company office. As a result, more than 6000 keys are kept on file and turned over each day to the appro-

priate meter readers.

As a result of the overall program, the number of "not-at-homes" has been reduced over 30 per cent in just eight months. The obvious advantage is fewer estimated bills and correspondingly fewer delinquent accounts, customer complaints, and explanations to the customer.

The standard meter sheet is housed in the meter book. These are locked in a unit separate from the cover and cannot be removed without a key. When changes are necessary, a record correction *(Fig. 3)* is used. This form is made out by a meter reader and is routed through the bookkeeper and other departments as required when customer data is changed. A meter investigation request form *(Fig. 4)* is filed in the meter book so that where a meter requires service, the reader makes out a record on the spot and submits it to the proper departments for handling.

Equitable, knowing the value of customer good will, goes to great length to maintain complete and accurate customer service location records. This is a permanent reference index on all meter locations. It is used by the credit and collection department, and the account information department, among others, and is the origin of all meter service orders, connects, disconnects and appliance service calls. The customer service center is shown in *Fig.* 5.

Information for these cards was obtained from old records and required collection of data from 700,000 cards. Information kept here includes address, name, district, route and folio number, meter number, size and make, date installed, meter reading and other entries.

Fig. 2. Meter reading books are housed in wall racks.

The system has been so carefully set up that less than 60 seconds after a call is completed, a work order is started on its way to the service department. Here's the way it works: Starting with the call at the telephone switchboard, the operator first determines the

RECORD CORRECTION ORDER

AS SHOWN		CORRECT TO
	ACCOUNT NO.	
	NAME	
	SERVICE ADDRESS	
	METER NO.	
	MAILING ADDRESS	
	CLASS	
	RATE	
	MINIMUM	

DATE	ROUTE TO	✓	WORKED BY	DATE	REMARKS
	UNIT BOOKKEEPER				
ISSUED BY	BILLING RECORDS				
	METER HISTORY				
APPROVED	CUSTOMER HISTORY				
	CUSTOMER SERVICE				

EQUITABLE GAS COMPANY

FORM NO. E10-08239

Fig. 3. Record correction form.

ADDRESS

DISTRICT	CLERK	FOLIO	METER NO.

CUSTOMER

REMARKS

DATE | REPORTED BY

Fig. 4. Meter investigation request form.

Fig. 5. Customer service center is set up to efficiently handle any type of adjustment or complaint.

street location, then connects the customer directly to the cabinet where this information is kept. The girl here refers to the Kardex record of that meter location and posts requests for service directly to the meter order card from her files. The meter card is removed and sent to the dispatch center for immediate processing. Thus the meter card becomes the order and no time is lost in any rewriting and no errors are made in transcribing.

Appliance service calls or complaints are processed in a similar manner on the service investigation order card located in the same file system. Space is provided here for four orders on the card since it is felt that the history of previous calls helps both the clerk and the servicemen to provide better service.

The customer service location record is manned 24 hours a day. Calls for on and off orders and service requests average over 12,000 per month, and most are handled in less than two minutes.

Another innovation which has cultivated good customer relations is the improvement of the distribution department and the dispatch center. Formerly, most incoming calls were received directly by the dispatch center. Others were handled by the district offices, and the customer was shuttled from one to the other before the right person was reached. Three different classes of servicemen were employed to handle various types of service calls. Appliance servicemen made installations and adjustments; fitters handled all meter work and leak complaints; servicemen made normal turn-ons and turn-offs.

Now the entire area is divided into six divisions which are in turn divided into service areas with an individual serviceman assigned to each area. Each man is trained to handle all types of service work in his area.

All service orders are received in the dispatch center from the service location record mentioned earlier. They are screened as to urgency and sorted into one of five divisions (sixth division is suburban and operates independently). The dispatcher assigned to that division logs all calls on a meter order route sheet or a service investigation route sheet. Emergency requests are dispatched by radio for prompt handling. Other calls for same day service are relayed by phone to servicemen as they call in (*Figs. 6 and 7*). Orders for other than same day service are mailed to the division offices for handling the following day. Orders received after the daily deadline for sending to the division offices are sorted by service area in a pigeon hole rack on the dispatcher's desk. These are periodically given to more than 50 servicemen who operate on a "call-in" basis and phone three or four times a day for such orders.

In addition to these 50 call-in servicemen, there are 60 radio-equipped service trucks which operate on a 24-hour a day schedule. Emergency orders are routed immediately from the screening dispatcher to the radio operator for transmittal to one of these trucks. A control panel shows the radio operator at a glance which vehicles are available for calls and which are out of contact.

When a serviceman leaves the truck for any reason, he reports this to the operator. The operator turns out the signal light assigned to that truck until the serviceman reports that he is again available for calls.

After work is completed, work orders are routed back to the dispatch center where they are checked against the route sheets of outstanding orders. Any order not returned in one week is followed up to determine why it has not been taken care of and returned. Each dispatcher is kept informed of the number of unfilled orders assigned to servicemen and adjustments are made so that waiting

Fig. 6. Radio dispatcher can keep in constant touch with company's 60 radio-equipped service trucks.

customers are not given promises that are not kept.

A word might be said concerning the customer history record, for this phase of the program itself has improved collections and has indirectly boosted customer relations. This is a complete history of all past experiences Equitable has had with each customer regardless of where he has lived on their lines. Names are listed alphabetically and filed phonetically by Soundex. Here in one record is combined a complete history of each customer, including name, application for service, collection record, address, folio number, deposit ledger record, copy of deposit receipt, inactive accounts ledger, bad debt record, reserve account record and appliance sales record. The consolidation of all these facts in a single location speeds the approval of new applications and the handling of collection effort. Outstanding bills can be followed up quickly, yet with understanding based upon all available facts.

Equitable, according to President A. W. Conover, is dedicated to providing the customers with the finest and most modern, convenient, economical, friendly and dependable service they can offer. The policies in effect over the past few years attest to that statement. ■

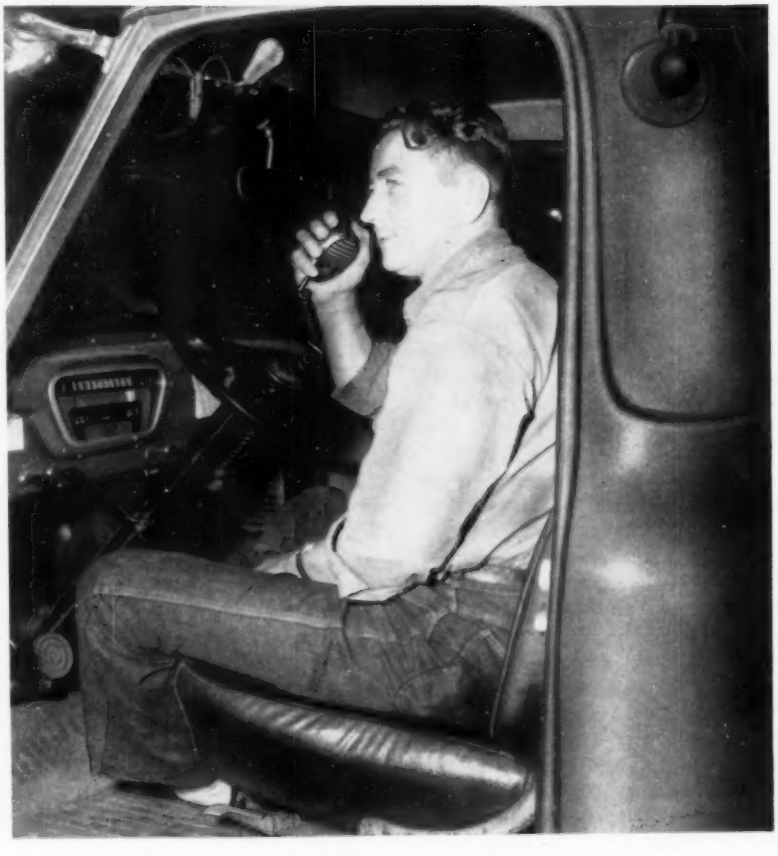


Fig. 7. Radio equipped service trucks speed handling of emergency orders. Company has 60 trucks equipped in this manner.

The key to successful operation of an efficient pipeline is the adoption of a long range preventive maintenance program. Here is a plan that might prove advantageous to your operation.

GAS exclusive

Long range preventive maintenance plan for steel gas mains

By ARDELL E. SCHMITT
Southern California Gas Co.
Los Angeles

"PREVENTIVE" maintenance is the key to a successful pipeline maintenance plan. In the past, only two alternatives were available to the maintenance engineer: that of repairing or replacing a section of main damaged by corrosion. Cathodic protection and other "preventive" techniques are now being utilized extensively to arrest corrosion and extend the life of pipeline facilities, thus greatly reducing maintenance costs.

In order to maintain a pipeline facility in peak condition and at the same time reduce maintenance costs, it is necessary to go beyond normal maintenance requirements —preventive maintenance is the obvious solution. To understand what is meant by preventive maintenance, it is necessary to distinguish between preventive maintenance and major repairs. Preventive maintenance is applied to prevent a facility from deteriorating in value and usability, but does not permit recovery from a state of neglect and deterioration. To be successful, a preventive program must be aggressive and continuous; it must seek causes of deterioration and correct them. The ultimate result should be a reduction in repair and replacement costs greater than the added cost for preventive maintenance.

This maintenance plan is the author's concept of an ideal plan and is not the actual plan used by Southern California Gas Co.

In recent years, many developments have been made in this field by various people in the company and other members of the gas industry and related fields. Many of these developments have been incorporated in this plan.

The object of a pipeline preventive maintenance plan is to maintain your underground facilities in a condition that is free from hazardous leakage, has no uneconomical gas loss and is not injurious to public good will; and to perform the maintenance function at the lowest possible cost.

In order to accomplish this a preventive maintenance plan should include (1) a leakage investigation program that will discover all leakage that would be detrimental to the success of the plan, (2) a main replacement program that is geared to the actual rate of pipeline deterioration and (3) a corrosion control program which provides the application of corrosion control techniques to new installations and to existing facilities where economics indicate that it would be feasible.

Without corrosion, there would be little need for a maintenance plan. Corrosion is an electrochemical action which may occur whenever there is a metal surface in contact with a conducting electrolyte. Substances whose aqueous solution conduct electricity are electrolytes. In general, acids, bases and salts are electrolytes. When pipe is buried in the ground, some areas become anodic and others cathodic, resulting in a flow of current from the metal surface to the surrounding soil and back to the metal. Ferrous ions are formed with this flow of current which combine with particles in the soil to form corrosion products. This loss of metal results in areas of pitting and corrosion. The quantity of metal freed is proportional to the amount of electricity that leaves the pipe (Faraday's *Laws of Electrolysis*).

There are two types of current which may cause corrosion. They are: *galvanic*, or local cell current, which is self generated and *stray*, or impressed, current. The common flashlight battery is a simple form of galvanic cell. The zinc con-

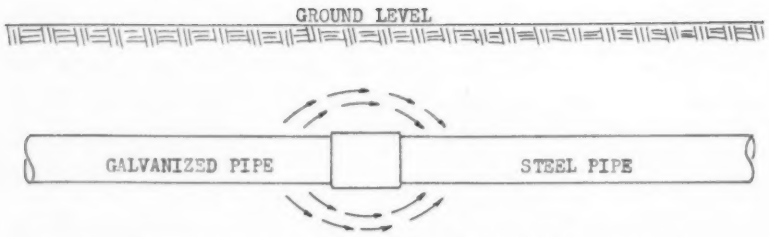


Fig. 1. Corrosion due to galvanic currents produced by dissimilar metals.

tainer acts as the anode and the carbon rod in the center is the cathode with the chemical electrolyte packed around it. In producing the electric current, the zinc container corrodes. After continued use, the battery fails because the zinc container is ruptured by pit hole corrosion from the inside. Galvanic currents may be generated in a pipeline by a dissimilar metal coupling, dissimilar surface, dissimilar soil, differential aeration and other causes *(Fig. 1)*.

Stray currents are impressed from street car lines, electric welding apparatus, and leakage currents from other electrical devices *(Fig. 2)*.

In general, soil resistivity may be used as a rough index of the corrosiveness of alkaline soils. It is not, however, a satisfactory index for the corrosiveness of acid soils. A soil with low resistance readings is apt to produce rapid corrosion while soil with high readings will usually experience a slow rate of corrosion. Also whenever there is a marked change in readings, corrosion is likely to occur in the lower resistance soil. Soil resistivity can be measured in the laboratory or in the field by using a soil rod instrument. The latter method is by far the most satisfactory as the readings may be taken in quantity with less labor expense, and under conditions identical to those in which the pipe is subjected. Soil rod readings should always be taken prior to a new pipeline installation, in order to determine the need for protection from corrosion; they may be taken in conjunction with a barring survey on existing mains.

There are several types of survey which may be used in locating leakage in a system. The vegetation survey and the street opening survey are perhaps the most economical methods. In small concentrations, gas has the effect of a fertilizer causing vegetation to grow rapidly and appear exceptionally green and vigorous; however, larger amounts of gas will kill grass, shrubs and trees and may be easily detected. This method is not adequate as a sole means of detecting leakage because property damage and injury to public relations have already occurred when the discovery is made. It may be used to supplement other surveys and on new mains until near retirement condition and leakage is expected. The street opening survey consists of examining manholes, vaults and other street openings for gas indications. Again this method is economical but will not adequately discover all leakage.

Experience has proven that there is a much greater possibility of discovering all of the leaks if a barring survey is made. Barring consists of drilling a small hole over the main and testing where more accurate results may be obtained. Since this method is more expensive, it is usually not scheduled until the condition of the main becomes doubtful. A more economical method of barring is sometimes used in which the bar holes are made outside of the paved area of the street. Obviously, this procedure is not as effective as barring over the main.

The leakage investigation program adopted should be one that will discover all leakage that would impair the success of the maintenance plan, and one that will accomplish this at the lowest possible investigation cost. It can readily be seen that intensive leakage investigation surveys should be conducted where pipe is in doubtful condition and that very little investigation work need be done on new pipe. Factors other than age and condition which will influence the method and frequency of investigation surveys are location (such as near a school, hospital or other public building), soil resistivity and the extent to which the pipe is protected from corrosion.

The problem of determining when replacement is justified is largely an economic one and involves a comparison between the

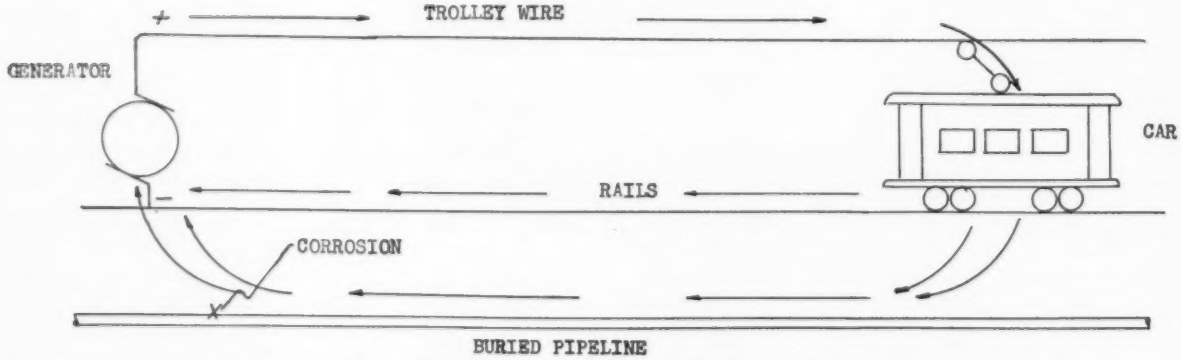


Fig. 2. Corrosion caused by the leakage of currents from an electric railway.

annual cost of retaining the old main in service and the cost of installing and owning a new one. Such economic studies alone are not a substitute for good judgement but are essential to the guidance of replacement vs. repair decisions.

In general, the costs involved in owning and operating a pipeline, or other facility, are interest or return on investment, depreciation, taxes, and maintenance and operating expenses. In making an economic study, the only cost figure of importance is the difference between the two alternative proposals. Therefore only costs which are peculiar to each alternative should be included. In addition to these costs, consideration must also be given to the risk of additional hazard, property damage and injury to public relations which accompanies leaving the old main in service. Attention should also be given to construction cost trends as they may have an effect on the cost of a replacement if deferred.

Sometimes conditions other than economics dictate the action to be taken in replacement vs. repair decisions. An extremely hazardous leak may require immediate attention—in less time than a replacement work order could be prepared and scheduled—consequently repair would be the only course of action. Governmental restrictions or public relations considerations may eliminate replacement as a possibility where a street has recently been resurfaced. If pipe deterioration is so bad that repair is not possible, replacement may be mandatory.

The development of corrosion control methods, including cathodic protection, is now well past the experimental stage although much work remains to be done in perfecting designs and improving practical installation and maintenance methods.

No matter how you look at it, corrosion costs money and corrosion control costs should be charged directly to corrosion. Some typical costs attributable to corrosion are:

1. Pipeline deterioration.
2. Cost of locating and repairing corrosion leakage.
3. Cost of pipeline replacement due to corrosion.
4. Value of gas lost.
5. Fixed charges and operating costs on corrosion control equipment.

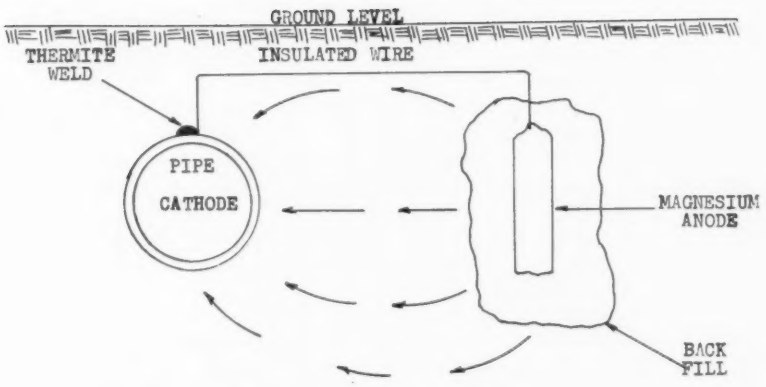


Fig. 3. Typical anode installation.

The object of corrosion control programs is to reduce the total annual cost of all items. This usually involves an increase in the last item in order to obtain a greater reduction in the total overall cost.

One solution to the corrosion problem is to place an insulating material around the pipe so that current cannot flow into the soil. This fact has been recognized for some time and many types of protective coatings have been developed. Because this method has been used extensively, its effectiveness has been demonstrated by many applications to pipeline systems over long periods of time.

Stray current and current from a dissimilar metal couple will accelerate corrosion at holidays and flaws in a protective coating. Insulating between unlike metals will break up the galvanic cells and insulating from other substructures will prevent access of stray current. Using other methods, such as cathodic protection, to combat these corrosion currents becomes economically prohibitive.

Stray current from streetcar lines, and other sources of direct current, may have access to gas mains through bare pipe or holidays in wrapped pipe. Because of the magnitude of this current severe corrosion may result at the point nearest the substation where the current leaves the pipe for return. Bonding the pipe to the substation to permit the current to return through the bond rather than the soil will prevent corrosion.

The flow of current from anodic areas to cathodic areas on the pipe may be stopped by applying an external current opposing the flow of the corrosive current. If sufficient current is applied, all of the pipe becomes cathodic to an auxiliary anode and all corrosion will take place on this anode. Pipe is said to be under cathodic protection when this condition exists.

There are two general types of cathodic protection, namely: galvanic, or self generated, and the power type. An example of galvanic protection is the anode installation *(Fig. 3)*. The anodes are made of magnesium, zinc or other metals high in the electrochemical series. These anodes are placed in the soil a suitable distance from the pipe and bonded to it by insulated conductors. The soil acts as an electrolyte and current flows from the anode through the soil to the surface of the pipe, neutralizing corrosion currents. The steel pipe is thus protected at the expense of the anode.

The rectifier station (*Fig.* 4), is the most common of the power type protection. It consists of an alternating current supply which is converted to direct current by means of a rectifier. One side of the rectifier is then connected to a ground bed (the anode) and the other side is connected to the pipeline which is to be protected (the cathode). Current will flow from the ground bed through the soil to the protected pipe, and will be drained off by the wire connecting the pipe to the rectifier.

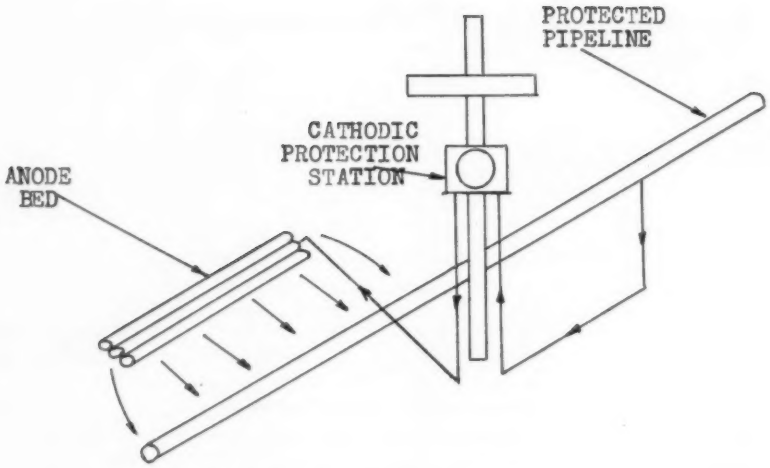


Fig. 4. Typical rectifier station installation.

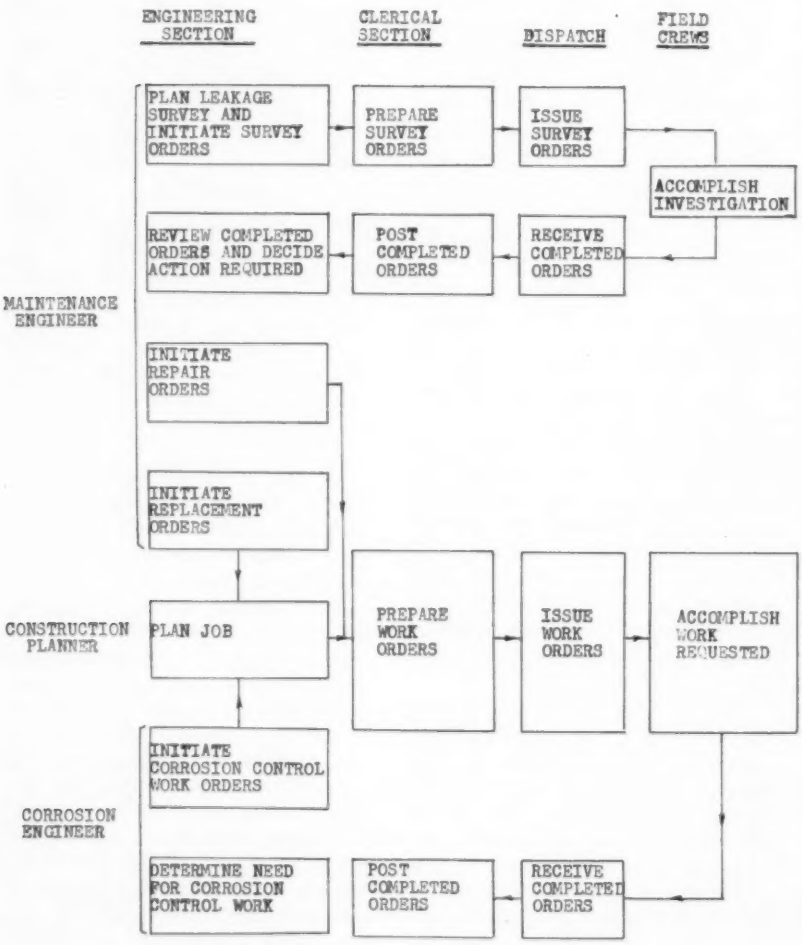


Fig. 5. Typical maintenance flow chart.

As the need is indicated, a combination of the several methods of corrosion control may be applied. Through intelligent use of protective measures, corrosion may be sharply reduced and the life of underground facilities extended indefinitely, thus greatly reducing maintenance costs.

In order to make accurate maintenance decisions, it is necessary to have available the maintenance history of the main and other pertinent data. Maintenance records should be designed so that the entire picture may be condensed and recorded on one easy-to-use record. The most satisfactory means for this purpose is the map. Leakage investigation orders, repair orders, pipe inspections and other detailed information may be kept in separate files; however, the maintenance map should be the basic record.

The maintenance map should, first of all, show all pertinent information about the system, such as the size and kind of main, fittings, date of installation, protective coating information and corrosion control facilities. New installations, replacements, and retirements should be posted, keeping the pipeline system up to date. To these basic records all maintenance work should be recorded, including leakage surveys, repairs due to corrosion, repairs due to causes other than corrosion, condition of mains uncovered for inspection and other purposes, soil rod readings and other information which might be valuable in evaluating a maintenance situation.

The first step in the maintenance cycle is the leakage investigation survey, which normally determines the need for maintenance action. The crew leader of the field crew performing the investigation work is in the best position to determine the degree of hazard of the leakage discovered and should include this information on the completed order. If the leakage found is hazardous, repair work may be completed before the completed investigation order is presented to the maintenance engineer for review, however, the maintenance engineer should normally determine the action to be taken and schedule the work accordingly. If repair is indicated, the repair order may be

prepared by the engineering clerical section and sent to dispatch, who will in turn schedule the work for execution. If replacement is the designated course of action, more preliminary work is necessary before the job may be performed. A work order number system should be used for replacements, job planning techniques should be utilized, and management approval may be necessary before work may be accomplished. After this preliminary work is accomplished, the replacement work order may be sent to dispatch for execution as was done in the case of repair work (*See Fig. 5*).

At this time, the situation should be analyzed to determine if protection from corrosion is adequate and the installation of any necessary protection or changes in existing protection should be provided in order to prevent further damage from corrosion.

Anyone may reduce maintenance expenditures and get away with it for awhile but eventually the accumulation of deferred maintenance will catch up with him. The real purpose is to cut maintenance costs and still maintain quality (*Fig. 6*).

There are basically only two ways to control maintenance costs —reduce labor and material costs. Here are some tools which may be helpful in developing a low-cost maintenance plan:

1. Set up a maintenance control group and endow it with the responsibility of the maintenance function.
2. Train your supervisors and maintenance crews.
3. Set up a manpower control to level out manpower requirements.
4. Develop standard practices and procedures.
5. Use work measurement to determine standard times.
6. Analyze and plan each job.
7. Use a work order system and budgetary control.
8. Provide material control.
9. Improve material and equipment whenever possible.
10. Keep adequate maintenance records.
11. Analyze performance and costs.
12. Set up a definite preventive maintenance plan.

The principles of pipeline preventive maintenance are not greatly different from those of other facilities in that the same techniques may be used to plan the maintenance activities and to control quality and cost of the maintenance function.

It is believed that the key to successful maintenance is in the adoption of a long range preventive maintenance plan. This allows better control of manpower requirements and eliminates idle periods and surges of work. In other words, mandatory maintenance work is reduced and the majority of work may be accomplished during regularly scheduled working hours. This greatly decreases overtime costs and in turn reduces maintenance costs.

The application of cathodic protection, and other corrosion control methods, will enhance the success of any pipeline preventive maintenance plan. Corrosion control techniques are a definite part of the maintenance problem and should be the responsibility of the maintenance control group. The design and application of cathodic protection systems should only be undertaken by an experienced corrosion engineer; however, the need for protection should be recognized by the maintenance engineer and in turn referred to the corrosion control group. ■

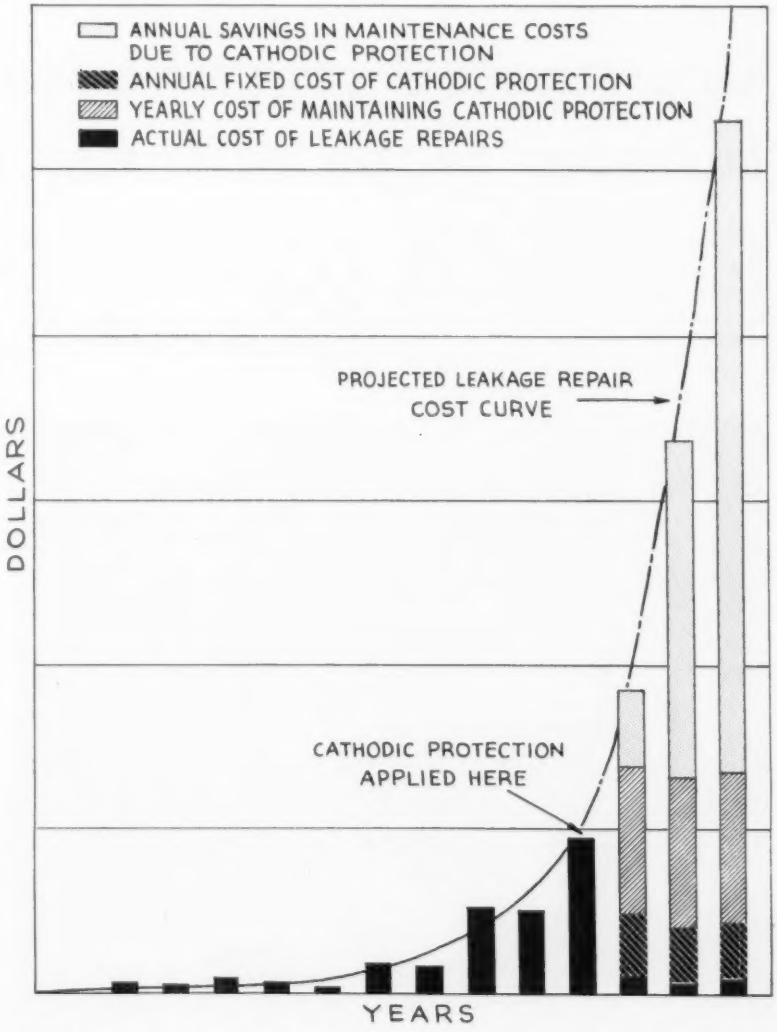

ANNUAL SAVINGS IN MAINTENANCE COSTS DUE TO CATHODIC PROTECTION
ANNUAL FIXED COST OF CATHODIC PROTECTION
YEARLY COST OF MAINTAINING CATHODIC PROTECTION
ACTUAL COST OF LEAKAGE REPAIRS
PROJECTED LEAKAGE REPAIR COST CURVE
CATHODIC PROTECTION APPLIED HERE
DOLLARS
YEARS

Fig. 6. Bar chart shows typical maintenance cost study of pipe placed under cathodic protection.

One of the greenhouses heated with gas is Copus Greenhouse in Lima, Ohio.

Gas-heated greenhouses produce bumper crops of fancy flowers

GAS-FIRED heaters have replaced boilers in two midwestern greenhouses, and have helped their owners cash in on seasonal flower markets.

Glen Copus, operator of Copus Greenhouse in Lima, Ohio, bought 12 Bryant gas-fired unit heaters and installed them in his greenhouse. He did it in time to raise a bumper crop of Easter lilies and get them on the market a couple of weeks before the 1956 holiday.

Mr. Copus placed the Easter lilies between two unit heaters and shoved the thermostat up. The heat wave had the same effect as sun rays, and the lilies bloomed early.

Another unit heater greenhouse installation was made in Fort Wayne, Ind. by DeRemer Florists in a tropical plant room. These highly sensitive plants are thriving. The florists plan to convert their entire greenhouse to gas-fired unit heaters soon.

The prime requisite of an effective greenhouse installation is good venting. On the Bryant unit heaters, the draft diverter is completely enclosed within the jacket, and the flue pipe is run either vertically or horizontally from an outlet at the back of the heater to a chimney or through the roof.

In this way, carbon dioxide is vented to the outside air and its formation ceases to be a problem in greenhouses. Gas produces none of the smoke, soot or dirt that injures flowers. ■

Greenhouse owner Glen Copus (left) shows some of his flowers to a visitor. One of the 12 unit heaters used in the building is shown at top left.

GAS utilization report

Canadian Report

THE GAS INDUSTRY IN CANADA

By FRANK CHAPMAN

CGA approvals program gains momentum

THE Canadian Gas Association's appliance approvals program, which became effective in the fall of 1956, will be moving ahead in high gear during 1957. By Dec. 1, 1957, the provincial governments of British Columbia and Ontario will make it mandatory that all equipment sold in their respective provinces bears the Canadian Gas Association seal of approval. It is also expected that for the time being the provinces of Alberta, Saskatchewan, Manitoba and Quebec will accept the CGA seal of approval without making it mandatory.

Evidence of the acceptance of the CGA approvals program is indicated in a mandate recently issued by the Calgary Gas Board to all manufacturers advising them that the board will not test any appliance unless it is furnished with evidence that the appliance has been approved by a Canadian Gas Association laboratory.

The approvals program will include the writing of specifications and the operation of testing laboratories, issuing of seals, listings and approvals. Specifications will be written by the Canadian Standards Association, and at the outset will be based on the American Gas Association requirements for gas specifications and the Canadian electrical code for electrical specifications.

Laboratories of the Ontario Research Foundation at Toronto, the British Columbia Research Council at Vancouver, together with the AGA laboratories at Cleveland and Los Angeles have been authorized by the association to handle testing. Testing procedures at the Canadian laboratories have been patterned after those followed at the AGA laboratories.

The approvals program will be administered by a series of committees which have been set up by the CGA. These include representatives of the provinces, the gas utilities, the gas equipment manufacturers, CGA, LPGA, and others. Various subcommittees are set up to handle the different types of appliances.

The Canadian Gas Association will issue seals of approval for all equipment tested at its various authorized stations. The seal is a reproduction of the association's insignia in blue on a circular silver background.

As the program is getting under way, interim seals will be issued for all equipment bearing the AGA or the Calgary Gas board seal of approval for gas specifications and the Canadian Standards Association approval of application of electrical components. This seal will be identical with the CGA permanent seal except that it will be printed in yellow instead of blue.

Andrew C. Walker (left) is administrator of the new program and Norman E. Wilson (right) is chief engineer.

This is the first in a series of articles on activities of the gas industry in Canada. Future articles will discuss the growth and progress of Canadian distribution and transmission companies. Next month's Canadian report will be based on Consumers Gas Co. of Toronto.

Interim approval is secured through application to the CGA and upon presentation of copies of existing approval certificates from the AGA or the Calgary Gas board.

In the permanent set-up authorized out-stations of the CGA will be allowed to make the necessary tests on application of electrical components. This will mean one-stop testing for the manufacturer receiving both gas and electrical approvals. However, equipment that has been approved at the AGA laboratories or the Calgary Gas board for gas specifications only cannot be tested at a CGA laboratory for electrical testing only. Such equipment must be submitted to the Canadian Standards Association for its approval.

The seal of approval, a reproduction of CGA's insignia in blue on a circular silver background, will be issued for all equipment tested at authorized stations.

The two Canadian laboratories will test application of electrical components to insure one-stop testing while the American Gas Association, being an "out station" of the Canadian Standards Association, has elected to continue to operate as in the past. Therefore, the AGA laboratories will merely submit a report of testing to the CSA, which will, in turn, issue the actual approval or rejection. The CSA maintains its own laboratory and testing facilities in Toronto.

Appliance testing fees will be the same as those currently in effect at the AGA laboratories. Listing fees in the association's Directory of Approved Appliances and Listed Accessories will be $4 per line for appliances and $5 per line for components. Seals of approval will be supplied to the manufacturers from the association's office at 25 cents each. There is no charge for certificates of approval and listing.

The CGA is prepared to handle the necessary records to maintain a factory inspection program. It is the intention that all equipment that has received CGA approval and has been tested at the AGA laboratories will be factory inspected by AGA inspectors. These inspectors are to test both to gas and electrical specifications.

Following progress made in the CGA approvals program, the Calgary Gas board has reported that appliances manufactured outside of Alberta will not be tested at the Calgary laboratory unless they already carry the CGA seal of approval. If they do carry this seal they will be tested in the Calgary laboratory for altitude performance only.

Appliances manufactured in Alberta for sale outside of the province will not be tested in Calgary until they have obtained the CGA approval.

Administrator of the new approvals program will be Andrew C. Walker, who joined the association last fall. Although born in England, Mr. Walker has spent most of his life in Toronto. Before joining the CGA he was associated with the loan and finance business in various executive capacities.

Norman E. Wilson has been employed by the association as chief engineer of the program. He will be in charge of all engineering, technical and laboratory testing matters in connection with the program. Mr. Wilson is an engineering graduate of the University of British Columbia and has most recently been employed at the Underwriter Laboratories of Canada.

The CGA has also taken steps to add one or more technicians to its staff for a factory inspection program which is currently getting under way. These additions should bring the program into full swing. ■

A victory dinner marked the successful completion of the third PEP campaign sponsored by Houston Natural and United Gas Corp.

PEP Campaign hit in Houston

SALES of commercial gas cooking equipment with a total of 28-million Btu capacity set a new record during the 1956 PEP (performance, economy, profit) campaign conducted in metropolitan Houston by United Gas Corp. and Houston Natural Gas Corp. in cooperation with nine equipment dealers.

The PEP campaign was inaugurated by the AGA in 1953 to promote the sale of commercial gas cooking equipment.

During the recent victory dinner, L. P. Thomas, Houston's vice president in charge of sales, pointed out that equipment sold during the three-month campaign was valued at $136,000 compared with $36,000 worth of equipment sold during the first drive in 1953.

Mr. Thomas said that the 1956 total represented a 40 per cent increase over commercial gas cooking equipment sold during the campaign in the Houston area in 1955.

In a brief talk praising the 32 salesmen who participated in the drive, E. M. Cannon, Houston division manager of United Gas, said commercial equipment magnifies the many advantages found in gas appliances.

Citing the economy of gas, Mr. Cannon said that a survey indicated that 35,000 meals prepared in a Texas school cafeteria using electric equipment cost twice as much, considering all costs, as 175,000 meals prepared in another school cafeteria which had gas cooking equipment.

GAS exclusive

Pipelines are rapidly being extended into areas that have been without gas service. Engineers are being called upon to design completely new systems. One of the big problems in designing the system is the pressure scheme. Here an engineer offers his solution.

A pressure scheme for new distribution systems

By H. M. McCAMISH, Chief Engineer (Development)
Sui Gas Transmission Co. Ltd., Karachi, Pakistan

TO the engineer who has inherited the usual natural gas distribution system resulting from years of growth under changing technological conditions, the opportunity to design a complete system today without any restrictions imposed by existing facilities is a dream to be savored in quiet moments of contemplation. It would seem that nothing could be easier than to design such a system unfettered by the left-overs of one's predecessors, but when actually faced with this "dream" situation the engineer will find that he is faced with some rather unique problems. Starting with a completely new system, he has virtually no fixed points to work from in determining the pressures to be used in the various sections of the distribution system; and consequently he must meticulously evaluate for himself the reasons for using given pressures or allotting certain pressure drops.

With the rapid expansion of natural gas transmission lines providing natural gas to cities, towns, and hamlets which previously had no existing gas systems, more and more engineers are facing this problem. There obviously cannot be a single correct answer to a problem involving so many possible variables, but it is hoped that the solution offered in this article will be useful for comparative purposes and will bring out certain considerations which might easily be overlooked.

The establishment of a complete pressure scheme is the first step in designing a new distribution system; and, if this is carried out wisely and carefully, little difficulty will be experienced with the orderly expansion of the system in the future. In order for all sections of the system to operate properly together in the future as well as the present, the inter-relation of the functions must be carefully analyzed. A sound scheme should include the following basic features:

(1) The pressure drops allotted to each type of main should be such as to provide for the most economical construction costs overall by allowing the use of reasonably small pipe for the function involved in each case.

(2) A pressure drop should be allotted for each pressure reduction phase such that the size regulators required will be reasonable in cost.

Type of Main	Design Pressure Ranges in psig		
	Initial	Possible	
TRANSMISSION MAIN	1070-170	1070-170	TRANSMISSION
Sales meter station			
SUPPLY MAINS	100-50	150-70	
Town border station			
FEEDER MAINS	40-30	60-30	DISTRIBUTION
District regulator station			
DISTRIBUTOR MAINS	20-5	20-5	

Table 1. Example of reasonable pressure scheme.

(3) The inlet pressure assumed for design purposes for a given type of main should be the minimum design outlet pressure for the previous type of main less the pressure drop allowed for the pressure reduction between the two types of main.

(4) Allowance should be made if possible for unforeseen expansion of gas loads by also providing a higher range of pressures to which the supply and feeder systems can be raised if necessary (this requires that the maximum working pressures of these systems be based on the higher possible range of pressures).

The long lengths and magnitude of throughputs for supply mains generally require that a large proportion of the total pressure drop available be allotted to them. The number and loading of feeder mains usually allows the use of a much smaller pressure drop for this type of main, and designing for a smaller pressure drop makes the feeder main pressures more stable with varying loads. Service lines should be designed for very small pressure drops (say .5 psi) which means they need not be considered as an appreciable source of pressure drop in the overall scheme. Experience has indicated that a 10 psi drop is reasonable for regulation needs, except for stations with very large throughputs where 20 psi is desirable.

The exact scheme evolved in a given case naturally depends upon the initial pressure available to the distribution system as well as to local regulations concerning distribution pressures, but a typical example of a reasonable pressure scheme based upon the above considerations is shown in *Table 1.*

With this system it is possible to increase the throughputs beyond the initial design on any given supply main or feeder main by 5 per cent and 100 per cent respectively by simply changing the pressure settings as required at the sales meter station and the town border station. In order for this system to be practical the working pressures of piping, valves, regulators, etc., must be established in the first instance for each type of main such as to allow raising the pressure if necessary to the "possible" range.

From the above, the method is extended to the industrial and commercial customer meter stations and houselines in a similar manner, and allowing again for a 10-psi pressure drop across the regulators (except in the case of distributor mains), the maximum serviceline inlet pressures allowable are as follows: for customers connected to supply mains, 40 psig; feeder mains, 20 psig; distribution mains, 1 psig.

Since there is normally little or no justification for serviceline inlet pressures exceeding 20 psig, this can be established as the normal maximum figure for use with very large industrial customers who can then be served from either supply mains or feeder mains. For smaller industrial customers lower serviceline inlet pressures are adequate so for uniformity certain intermediate pressures can be established (viz: 8 psig and 14 psig). By standardizing the distribution piping pressures so that customer metering pressures can be limited to a few standard values, it is possible to design a range of customer meter stations on the basis of design maximum hourly loads only. Besides eliminating "special" designs for each new customer, this method greatly reduces the number of customer meter stations which must be re-built in the future as the system continues to expand.

To determine the pressure to be made available to the utilization controls at the actual point of use (i.e. boiler house, kiln, etc.), it is necessary to relate reasonable figures for this purpose to the total pressure drop available and the resulting effect upon the size of serviceline required. A great majority of the actual burners work on less than 1-psig pressure and the utilization regulators controlling this pressure normally are sized for operation with less than 1-psi drop across them. Thus if a serviceline terminal pressure of 5 psig is provided for, there is ample leeway for even poorly designed utilization equipment. A terminal serviceline pressure of 5 psig allows serviceline pressure drops as shown in *Table 2.*

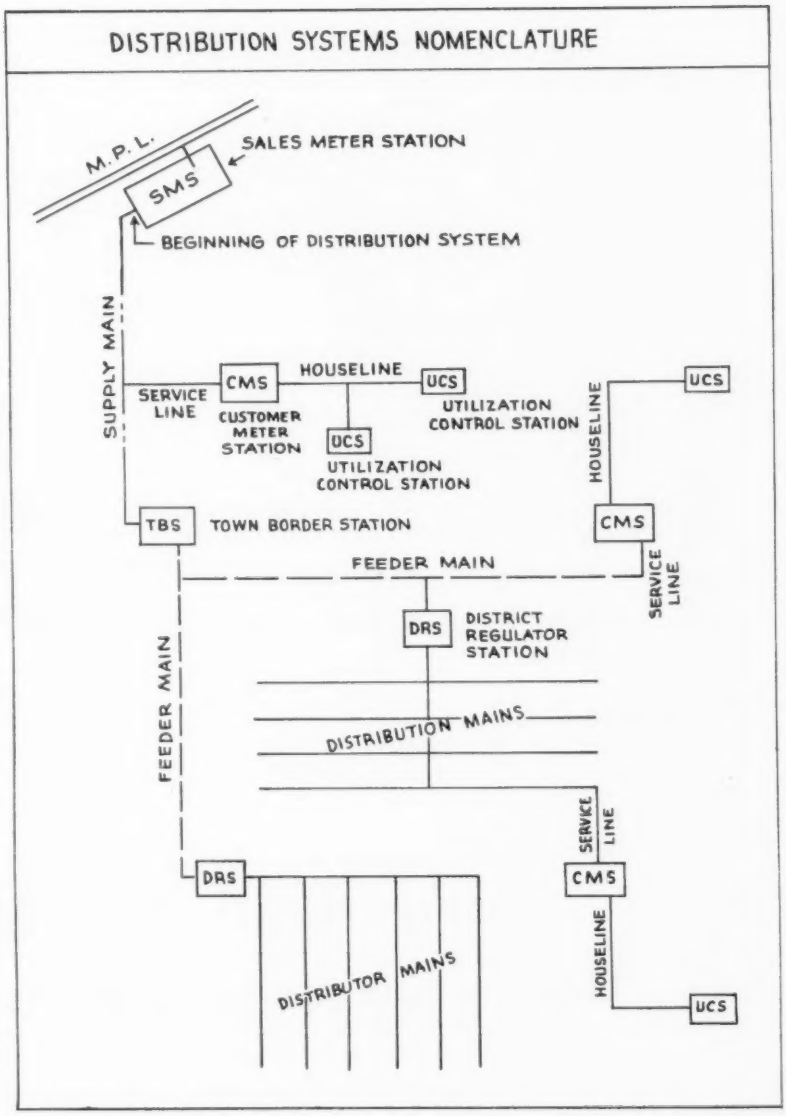
The selection of which range to apply to a given customer depends upon the size of the load in question and the length of serviceline required, but proper selection will provide a reasonable size serviceline for all but very unusual cases. The lowest, reasonable range should be used in each case.

To handle large burner equipment designed for highest pressure gas (e.g.: large kilns) it is necessary to increase the serviceline inlet pressure to 20 psig. For the very largest loads, even the use of 20-psig inlet pressure will require large diameter servicelines if distances are great. When

Table 2. Pressure Drops for Terminal Service Line With 5-PSIG Pressure.

	Serviceline Inlet Pressure	Serviceline Outlet Pressure	Pressure Drop Available
(b)	14	5	9
(a)	8	5	3

Fig. 1. Summary of the proposed pressure scheme.



the customer is connected to a supply main, the serviceline inlet pressure could be increased to as high as 40 psig without decreasing the design capacity of the system but the advantages of standardization would be lost. When service is from a feeder main 20 psig should never be exceeded. Each special case must be considered individually, but the gas company should generally resist higher service pressures than those selected. It is a good idea to require the chief engineer's approval of any deviations from the "standard pressures." If informed that large pressure drops are available, utilization equipment manufacturers will naturally take advantage of this to design smaller (and consequently less expensive) equipment, but it is entirely practical to design reasonably priced, high pressure burners for very large installations with a maximum of 10 psig at the burner. Allowing a 5-psi pressure drop for the utilization controls, which is ample, this allows a maximum serviceline terminal pressure of 15 psig; and in the great majority of cases this can reasonably be provided by a serviceline inlet pressure of 20 psig.

From the above facts, it follows that utilization equipment manufacturers should be quoted the following pressures for their

DISTRIBUTION PRESSURE SCHEME

All pressures are in psig

	SUPPLY MAINS		T* B S	FEEDER MAINS		D* R S	DISTRIBUTION MAINS		C* M S	SERVICE LINES		U* C S	UTILIZATION	
	P_1	P_2		P_1	P_2		P_1	P_2		P_1	P_2		P_1	P_2
	Outlet SMS	Inlet TBS (or CMS)		Outlet TBS	Inlet CMS (or DRS)		Outlet DRS	Inlet CMS		Outlet CMS	Boiler House etc.		Inlet Controls	Burner
Case 1	100	50		—	—		—	—		40**	15		15	10
Case 2	100	50		40	30		—	—		20	15		15	10
Case 3	100	50		40	30		—	—		14	5		5	1
Case 4	100	50		40	30		—	—		8	5		5	1
Case 5	100	50		40	30		20	5		¼–1	¼–1		—	¼–1
Case 6	100	50		—	—		20	5		¼–1	¼–1		—	¼–1

P_1 in each case is the maximum pressure for flow design purposes.
P_2 in each case is the minimum pressure for flow design purposes.
* TBS = Town Border Station.
DRS = District Regulator Station.
CMS = Customer Meter Station.
UCS = Utilization Control Station.
** Can be used but 20 PSIG should be the maximum specified except for unusual cases.

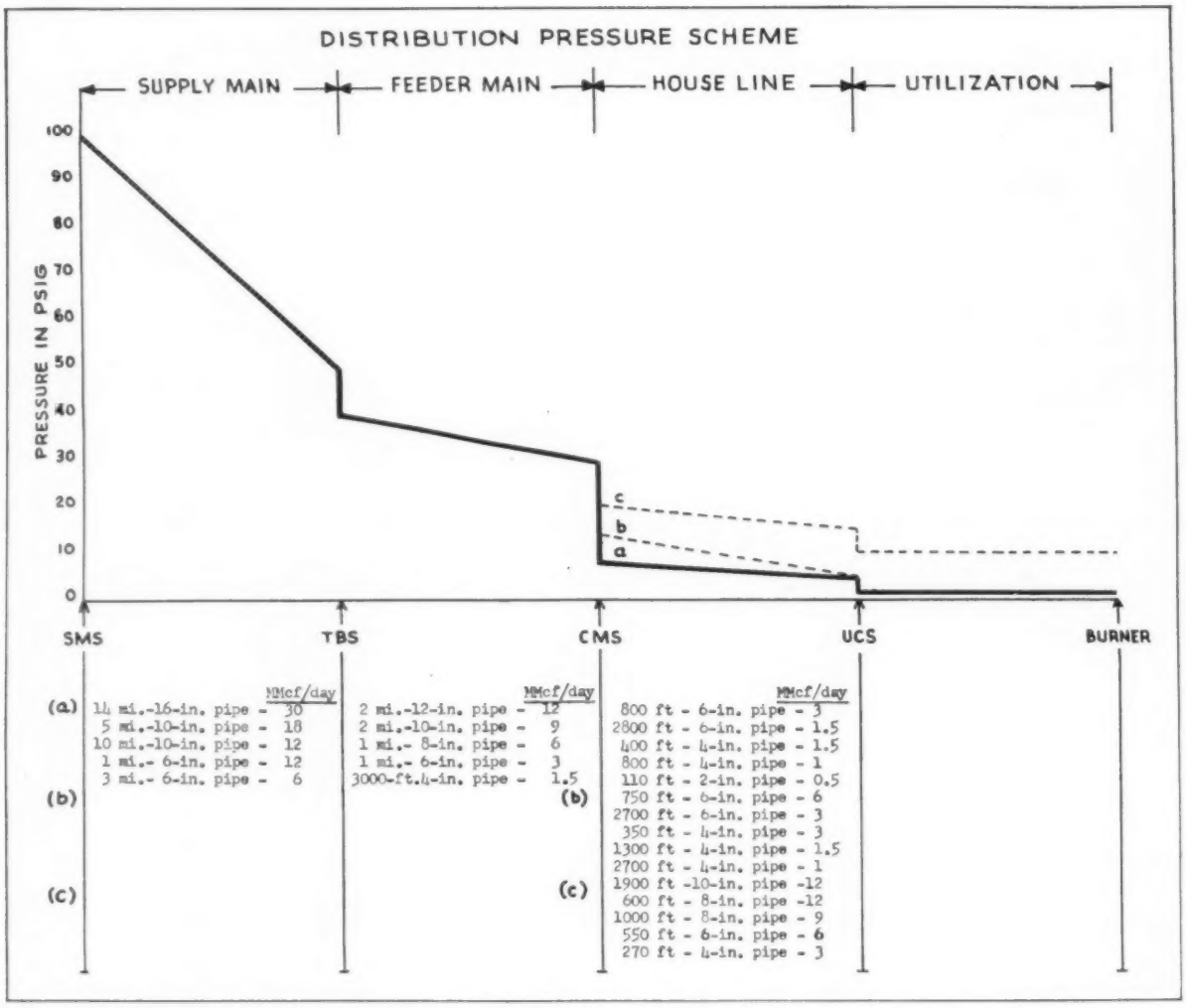


Fig. 2. Graphic illustration of the sample pressure scheme.

design: low pressure units (includes most boilers, furnaces, etc.), 5 psig; high pressure units (unusual applications, large kilns, etc.), 15 psig.

These pressures should be stated to be the design pressure available at the boiler house, kiln house, etc., not the pressure at the burner which should be taken as something less than 5 psig or as something less than 15 psig respectively, the exact amount depending on the suppliers design of the burner control equipment.

Fig. 1 summarizes the proposed pressure scheme. Obviously large industrial loads could not be connected to the "distributor" class of main.

Fig. 2 illustrates the sample pressure scheme graphically and gives some representative capacities for various lengths and diameters of pipe for each class of main. These figures show that the scheme is quite reasonable and largely accomplishes the objectives as set forth earlier in this report.

It is unlikely that any single feeder main will carry as much as 12 MMcf/day but this can be done if required up to a distance of two miles with 12-in. pipe (as a distributed load this distance would be increased to three miles). A 6-in. diameter feeder main can carry 3 MMcf/day for a distance of one mile or, as a distributed load, for a distance of three miles. This means that most of the feeder mains will be 6-in. diameter or smaller. It is doubtful that many single, low pressure utilization installations will use as much as 3 MMcf/day; but for any that do, 6-in. pipe can still be used for the serviceline up to a distance of 800 ft with 8-psig service pressure. By going to 14-psig service pressure the serviceline length can be increased to 2700 ft at 3 MMcf/day; or 6 MMcf/day can be handled up to a distance of 750 ft. For the usual loads of 1.5 MMcf/day or less, 4-in. diameter servicelines will provide ample capacity for the distances normally encountered. For the very large industrial loads using high pressure burners, 6-in. and 8-in. diameter servicelines will suffice for most applications and 10-in. will handle the difficult cases (largest loads plus extra long distances).

This is a typical billboard seen by thousands of people daily in Brooklyn. Cooperative program between appliance dealer, manufacturer and Brooklyn Union Gas Co. makes sign program possible.

Brooklyn Union finds that appliance promotion pays off

Although Brooklyn Union merchandises appliances itself, it doesn't let that fact stand in the way of helping dealers do a better job, too. Working on the theory that anything that can be done to help sell gas-fired appliances means more income, the company has embarked on a strong cooperative program with dealers in Brooklyn and Queens.

THE Brooklyn Union Gas Co., serving over 850,000 customers in Brooklyn and Queens, New York, is also serving more than 1000 dealers and local plumbers with a comprehensive promotion program designed to help them sell more gas appliances. BU merchandises appliances, true, but the company is equally interested in encouraging dealers to add to the number of ranges and water heaters and furnaces on the company's lines. Thus the utility spends a great deal of time and thought in setting up programs that will tell the story of gas to the dealer's own customers.

The company has developed a complete promotion program available to the dealer at a nominal cost. They supply sign boards with appropriate messages; they offer direct mail literature to be sent out by the dealer to his customers; they cooperate in buying newspaper space and produce broadsides and point of sale material which is offered in a package plan.

Each season the advertising theme is patterned to fit local requirements. For example, recently the mayor of New York signed a new local law requiring all cold water flat owners to install central heat and hot water systems within a specified time limit. Brooklyn Union was quick to make certain that a gas installation would offer most to landlords and promoted these ad-

vantages through an aggressive program with plumbing and heating contractors. The gas company set up 20 billboards throughout the area and offered them to dealers on a cooperative basis. These feature gas central heating and are strategically located in the cold water flat areas as determined by the company's researchers. Dealers participating in the cooperative venture receive bundles of literature especially prepared with their own imprints, plus miscellaneous display materials for their stores.

Brooklyn Union is also vigorously campaigning for the sale of gas heat through ads in New York's leading newspapers and in foreign language newspapers and radio. In addition, four broadsides and four sales letters are planned for the drive. Two of each have already hit the mails. They are being sent directly to the owners of cold-water flat dwellings.

The cold water flat campaign is backed by a number of prime selling points as outlined by Brooklyn Union. Sales, even those by independent dealers, can be financed through the company. Interest rates and monthly payments are low. This financing includes not only the heat and hot water equipment but also the cost of boiler rooms, radiators and labor required for the installations.

Brooklyn Union backs up the low cost of gas heat in its area with a "certified proof-of-performance" test, similar to the money-back offer to one and two-family home owners that the company has successfully used for the past four years. If the cost of operating with gas exceeds the certified estimate made by the company on a degree-day basis, Brooklyn Union will remove the gas heating equipment. The payments on the equipment will then be applied to the balance of the landlord's account.

Dealers get a special allowance of $10 for each cold water flat in a building they sell plus the regular commission on the sale. Thus, with an average dwelling with, say six flats, the dealer makes a $60 bonus when he sells central gas heating equipment.

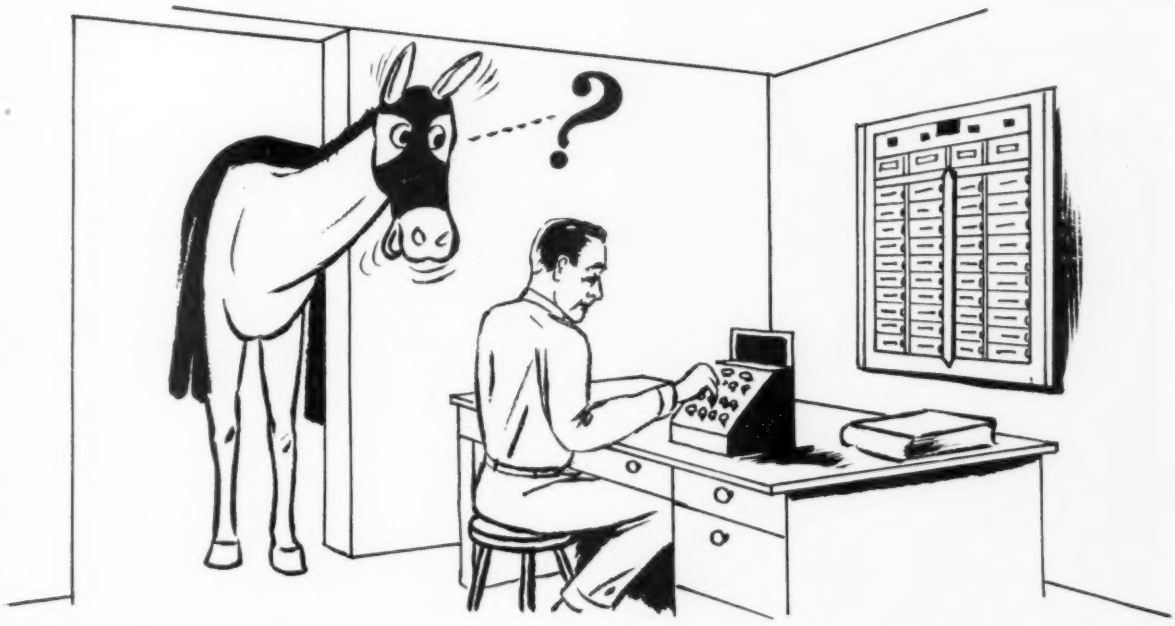
Another valuable service will be in filing plans with the Department of Air Pollution Control for owners of larger apartment buildings. The city requires detailed plans of all heating installations beyond a certain size. The company will make these drawings and file them at no cost to the landlords.

The company has also set up a landlord's service bureau for apartment house owners in the Brooklyn and Queens area to assist owners in complying with every aspect of the new heating law. The bureau is composed of experts in every phase of central heating and hot water supply. They offer free heating surveys of landlords' properties and assistance in the selection of the most economical equipment. The bureau helps landlords in applying for rent adjustments as well as providing help in financing problems. And these services are available to the customer whether he purchases the equipment from Brooklyn Union or from some other source.

The new multi-family heating market is one of the most active phases of the dealer cooperative program going on at this time. The dealer is, however, assisted in the sale and promotion of all gas appliances. Special dealer meetings are held from time to time. The company rents billboards which it, in turn, leases to dealers on a cooperative basis. These signs are located near the dealer's place of business; carry his name and pertinent message such as is shown here.

Appliance manufacturers are also tied into this cooperative advertising venture. As is noted, the dealer may feature whichever manufacturer's line he prefers. Cost is apportioned among utility, the manufacturer and the dealer. ■

This sign pushes top burner heat control for ranges. Top line copy varies, some say "No Boil Overs," other "No Pot Watching." Third line changes with the participating manufacturer. Dealer also gets his listing.



Baltimore uses "tote board" to speed up service calls

A VISITOR making a quick trip through the gas fitting department of the Baltimore Gas & Electric Co. could easily think that he had made the wrong turn somewhere along the line and wound up at the nearby Pimlico racetrack.

It's not that the company has gone back to using horse-drawn vehicles, or has its personnel traveling by horseback. Rather, the illusion could be caused by the company's recent utilization of a "tote board," a familiar sight to race track habitues, to speed up its dispatching of service calls and scheduling of manpower.

A study was undertaken by the gas fitting department to develop a better method of dispatching service calls and scheduling manpower. Its main objective was the reduction of the time required to service customers' appliances.

It was evident early in this study that a mechanism of some kind would be necessary for recording customer service calls as they are received. After a review of available recording and calculating equipment it developed that the American Totalisator Co.'s race track "tote board" mechanism incorporated the desired features.

The information required by a customer service dispatcher to effectively handle calls and schedule manpower must include a running account of the service calls received, the promised completion dates and the manhours promised for each date. Fortunately, the classification of "request for service" calls according to type and time required to do the work parallels closely the number of items of information required to establish parimutual odds at a horse race. Horse race wagering odds are established by maintaining a running account of the win, place and show amounts placed on various horses in a race. The American Totalisator Co. worked with the fitting department to adapt their "tote board" machine to Baltimore Gas' problem. The tote board as it has been applied to the fitting department's operation enables the customer service dispatcher to observe at any time the actual manhours that have been committed on any one of three consecutive days. It also shows the distribution of the promised work by job classification.

The tote board is operated electrically and consists chiefly of a recorder that shows the visual record of the service calls, and a key panel by which the information is transmitted to the board. The key panel has three rows of keys. The top row is used to transmit to the tote board the day on which the customer's request for service must be completed. The two bottom rows transmit the

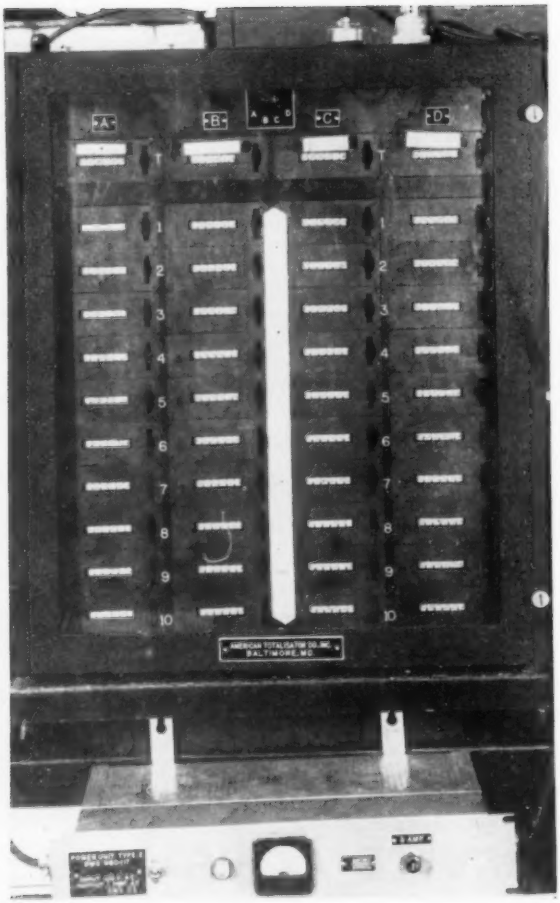


Fig. 1. This is the adapted version of the "tote board" now being used by Baltimore Gas' fitting department.

classification of the work. The mechanism in the board then transforms this information into manhours of work.

The visual integrators on the board show the total manhours of work committed at any time in each classification of work and the accumulated total work load promised for completion at any time for any one of the three consecutive days.

Fig. 1 shows a selector switch at the top of the board pointing to the "D" position. This indicates that column "D" represents the current day's work. Under column "D" at the time the picture was taken there had been 774.1 total manhours of work promised. The 774.1 manhours of scheduled work under column "D" consists of 235 calls classified as house heating requests; 85 as gas leaks; 229 as domestic and commercial, etc.

At the same time the selector switch points to the "D" or today's work, column "A" (in sequence) shows the second day's work, "B" the third day's work and "C" the unassigned work available for load balancing at a later date.

The board records are kept up to date each day by turning the selector switch to the next column in alphabetical sequence. The request for service tickets prepared by the customers service board are grouped according to promised completion dates and work areas. Those promised for completion and recorded under column "D" are dispatched immediately to servicemen. Requests for service calls that are promised for completion on subsequent days are dispatched later according to their respective dates and work areas.

This system provides the fitting department dispatcher with a record of the number of requests for service calls by job classifications as they have been promised for completion at any time during each of three consecutive days, plus the unassigned work that may be used for load balancing.

In addition, the record indicates to the dispatcher the total accumulated manhours required to complete the promised work on each of the three days. With this information the dispatcher is in a position to advise the customers service board (where request for service calls are received) to advance or delay the completion dates on subsequent requests received from customers. In this way the dispatcher controls the accumulated work load and avoids overtime work and the need for calling in additional manpower. It also permits him to adjust for predicted changes in the weather. Shifts in the dates jobs are promised for completion are made necessary by changes in the weather, variations in the gas mixtures distributed, operating emergencies, etc.

As is evident from the description of this new procedure, the main objective is to improve the service to Baltimore gas customers. The tote board is a definite step forward in giving better service to gas customers while at the same time providing a valuable aid to reducing operating costs. It has also helped to balance the available manpower with work load, reduce overtime work, and enable the dispatcher to more effectively handle the day-to-day swings in the service work load. ■

The control panel of the board used at Baltimore.

. . . look how wonderful a thermostat can be!

Fashion THERMOSTAT

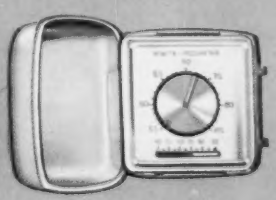
by WHITE-RODGERS

. . . dramatically styled for the most important market of all . . . HOMEOWNERS

the right shape no sharp corners, severe curves or circles to clash with room or furnishings . . . ***the right color*** Adobe-Beige, harmonizes perfectly with any color scheme . . . ***smart hinged cover*** removes the "mechanical look" forever and discourages unnecessary setting changes . . . ***can be painted to disappear*** just paint the entire cover to match wall, no dials peek through . . . ***replaces outmoded thermostats*** inconspicuous adaptor plate covers any spots or plaster scars left by old-fashioned shapes.

The *Fashion* . . . biggest sales promoter the industry has ever seen . . . creating demand everywhere!

CONTACT YOUR REGULAR SUPPLIER TODAY!



Type 120-115 for heating.

Type 121-115 for cooling.

TEMPERATURE CONTROLS for MODERN COMFORT

WHITE-RODGERS

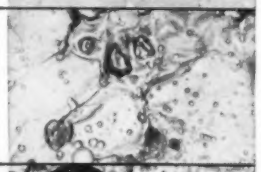
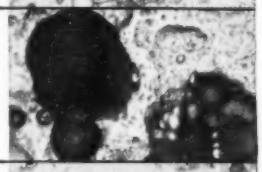
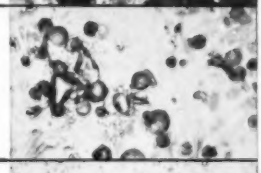
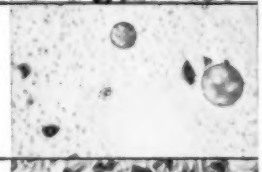
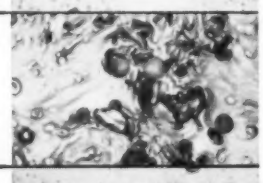
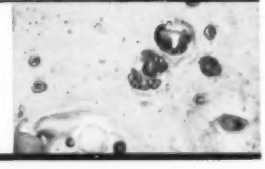
ST. LOUIS 6, MISSOURI — TORONTO 8, CANADA

A.O.Smith

Permaglas®

the glass-lined water heater with C.F.P.*

outlasts all others

BRAND	Unretouched Microphotographs of Test
A.O.Smith Permaglas® NO METAL EXPOSED TO CORROSION	
BRAND A Moderately Eroded METAL EXPOSED	
BRAND B Severely Eroded METAL EXPOSED	
BRAND C Badly Eroded METAL EXPOSED	
BRAND D Moderately Eroded METAL EXPOSED	
BRAND E Badly Eroded METAL EXPOSED	
BRAND F Moderately Eroded METAL EXPOSED	

HERE'S THE PROOF

An independent research laboratory conducted accelerated life tests of seven glass-lined water heaters. The certified results shown here PROVE beyond question that *Permaglas* outlasts ALL others!

*A. O. Smith's exclusive Controlled Fusion Process weds glass and steel to a more perfect bond.

HERE'S WHAT IT MEANS TO YOU

Now, for the first time, you actually *know* that there's a big difference in glass-lined water heaters—and that *Permaglas* lasts 55% longer than the average of all brands tested. You can PROVE that difference to your customers, and sell them *Permaglas* more easily than ever before.

And Here's a BIG NEW Campaign To Help You Cash in—NOW!

NATIONAL ADVERTISING—Full pages in color in nine leading magazines will tell this outstanding story to millions—to your customers.

LOCAL ADVERTISING—NEW ad mats, NEW distributor ads, NEW radio and TV material, NEW outdoor posters are all ready to help you in your neighborhood.

POINT-OF-SALE—NEW pocket demonstrators, NEW banners, NEW signs are ready to work for you.

SELLING AIDS—NEW envelope enclosures, NEW hand outs . . . EVERYTHING you need to sell.

CALL YOUR **Permaglas®** DISTRIBUTOR

BETTER GLASS—LONGER LIFE

Permaglas®

PROVED BY OVER 3,500,000 FAMILIES

Through research A.O.Smith *. . . a better way*

A.O.Smith

CORPORATION

Permaglas Div., Kankakee, Ill.
International Div., Milwaukee 1, Wis.
Licensee in Canada: John Inglis Co., Ltd.

makers of famous **Permaglas®** *heating and cooling . . .* **Burkay** *commercial water heaters*

GAS associations

AGA management sessions scheduled for next month

The spring conference of the American Gas Association's general management section will be held at the Edgewater Gulf hotel in Edgewater Park, Miss. on March 25-27.

According to Leslie A. Brandt, chairman of the section, the 1957 conference will cover a wide range of subjects, including organization planning, economic review, industry review, management's responsibility for safe practices, offshore gas, the functions of the National Labor Relations Board, stockholder relations, and the problem of economic education and municipal ownership.

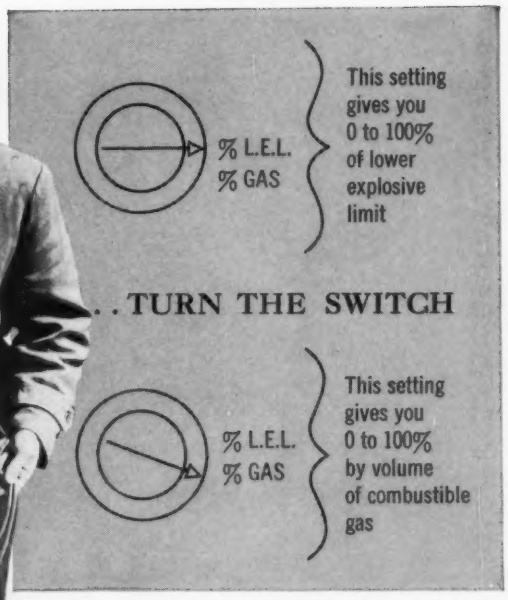
Ample time has been allotted for working committee sessions along with committee open sessions designed to inform specialists in the field of purchasing and stores and insurance.

Evans, Purcell head AGA public information group

Thomas H. Evans, vice president of Equitable Gas Co., has been appointed chairman of the American Gas Association's general public information planning committee for 1957. James F. Purcell, manager of public relations at Northern Indiana Public Service Co., will continue for a second year as chairman of the AGA public information projects committee.

The two groups comprise a 33-man task force that plans and conducts AGA's long-range program promoting better public understanding of the investor-owned gas industry. This program is part of the PAR plan and stresses close working cooperation with regional gas groups and local gasmen.

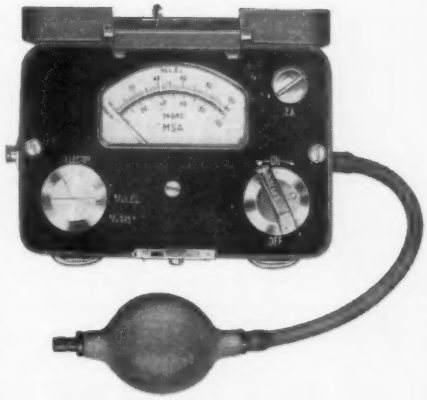
Six major information targets


% L.E.L.
% GAS
This setting gives you 0 to 100% of lower explosive limit
..TURN THE SWITCH
% L.E.L.
% GAS
This setting gives you 0 to 100% by volume of combustible gas

This New Simplicity —New Versatility in ONE instrument ...the M·S·A GASCOPE

The illustration above shows you how, with the simple turn of one selector switch, the M.S.A. Gascope gives you both high sensitivity for the detection of low gas concentrations, and immediate, quantitative response for tracing higher concentrations of gas to its source. Separate scales for each range are calibrated on the fan-shaped meter in the center of the instrument. Each scale is divided by 50 graduations to permit accurate, fast readings.

This dual-range, direct reading instrument is the modern answer to fast, dependable detection and location of gas concentrations over the entire range from 0 to 100% by volume. Write for details, or ask for a demonstration. Your request will be handled promptly.



The Gascope is light, comfortable, and demands no special skill to operate. A variety of accessories are available to meet all sampling conditions.

MSA SAFETY EQUIPMENT HEADQUARTERS

Call the M.S.A. man on your every safety problem... his job is to help you

MINE SAFETY APPLIANCES CO.
201 North Braddock Avenue, Pittsburgh 8, Pa.
At Your Service: 76 Branch Offices in the United States
MINE SAFETY APPLIANCES CO. of CANADA, Ltd.
Toronto, Montreal, Calgary, Edmonton, Winnipeg, Vancouver, Sydney, N.S.
Representatives in Principal Cities in Mexico, Central and South America
Cable Address: "MINSAF" Pittsburgh

LETTER
11-AM
7/11/57
FROM ABROAD
North Pole
Re: Nanook Mukluk
Igloo Heating, Inc.
Dear Boss,
Found North Pole in a cold-snap.
New Nanook is melting the igloos
with Straight-Thru-Flow. Send 100
Kayak loads Maxitrol regulators.
Send my long-johns,
Maxine
NORTH POLE
REDUCE PRESSURE DROP
WITH "STRAIGHT-THRU-FLOW"
Heating an igloo may not be your problem, but "Straight-Thru Flow" will solve your MANIFOLD DESIGN PROBLEMS. Manifold pressure drop can be substantially reduced by allowing the gas to flow "Straight-Thru" the regulator. Pipe diameter can often be reduced . . . valves and other manifold components can be smaller and less expensive.
Write Maxine for information on MANIFOLD DESIGN SAVINGS as well as other advantages realized with "Straight-Thru-Flow."
MAXITROL
COMPANY
12200 BEECH RD.
DETROIT 39, MICH.

1897 1957

PIPE STOPPERS OF ALL KINDS

SAFETY GAS MAIN

STOPPER CO. INC.

GOODMAN
USED SINCE 1897
2" HANDLE & LOCKING SLEEVE
GAS MAIN STOPPER

523 Atlantic Avenue
Brooklyn 17, N. Y.
Cable Address GASTOPPER, N. Y.

associations • *Continued*

for 1957 were approved by the committee headed by Mr. Evans: (1) Show the public service advantages of the investor-owned gas industry. (2) Demonstrate that gas is an expanding industry with a big future. (3) Develop a receptive climate for sales. (4) Help recruit new employees for the gas industry. (5) Win public support for the gas industry's financial and rate requirements. (6) Correct misstatements and prevent harmful publicity about gas.

This PAR program will continue to supply local companies with public relations items such as institutional ads, booklets, and speech materials. Seven regional PR workshops were held throughout the country in 1956 and more of these "idea clinics" are planned for this year. AGA will also expand its publicity coverage of the gas industry at the national level.

Chicago selected for 1959 AGA convention

The American Gas Association convention will return to Chicago in 1959 for the first time in 10 years. The dates are Oct. 5-7 and sessions will be held at the Conrad Hilton hotel.

St. Louis is the site of the 1957 convention, Oct. 7-9 at the Kiel auditorium. The 1958 meeting will be in Atlantic City.

American Gas Association promotes Ralbern Murray

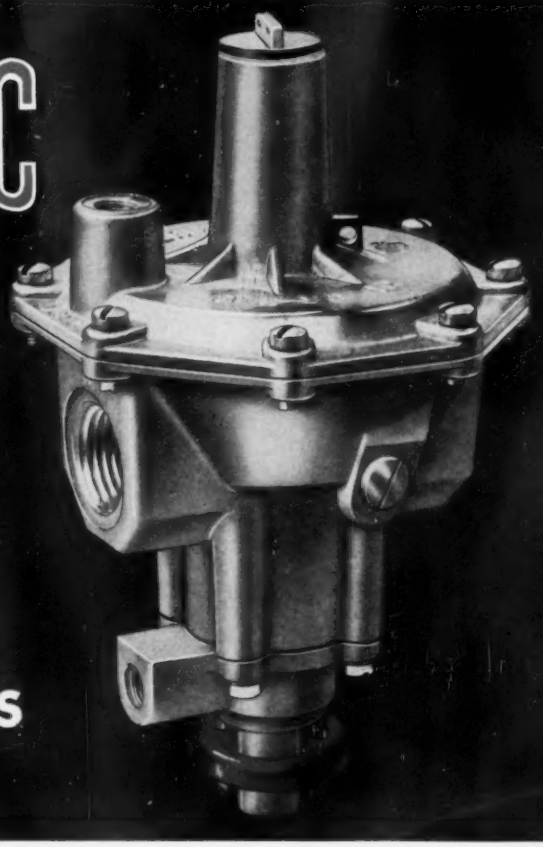
The American Gas Association has appointed Ralbern H. Murray as assistant secretary of the industrial and commercial gas section.

Mr. Murray has been with the AGA utilization bureau since 1950, except for two years in research and development work for the U. S. Air Force.

In his last position with the AGA, Mr. Murray worked on utilization problems of gas utilities and manufacturers, and served as a local appliance inspector for AGA Laboratories. He was also secretary of the American Society for Testing Materials Committee D-3 on Gaseous Fuels, and served on several other association committees.

Mr. Murray is a graduate of New York University, with a BS degree in chemical engineering and an MS degree in industrial engineering.

THERMAC



Finest
GAS CONTROLS

What the name THERMAC on a gas control means to you . . .

Undivided attention to the specialty of producing gas controls has resulted in a number of basic and substantial design features around which our present products are built.

Concentration too, in manufacturing and production methods is also vitally important. In our own modern plant we do the entire job from Engineering and Research to Assembly and Final Testing — no one else is entrusted with this responsibility. Therefore, the controls you buy today are the result of 24 years of highly concentrated effort in research and in manufacturing techniques. Our volume production methods are your assurance of low cost.

Sound engineering, expert manufacturing, low cost and prompt delivery — that's what the name Thermac means to American Appliance Builders.

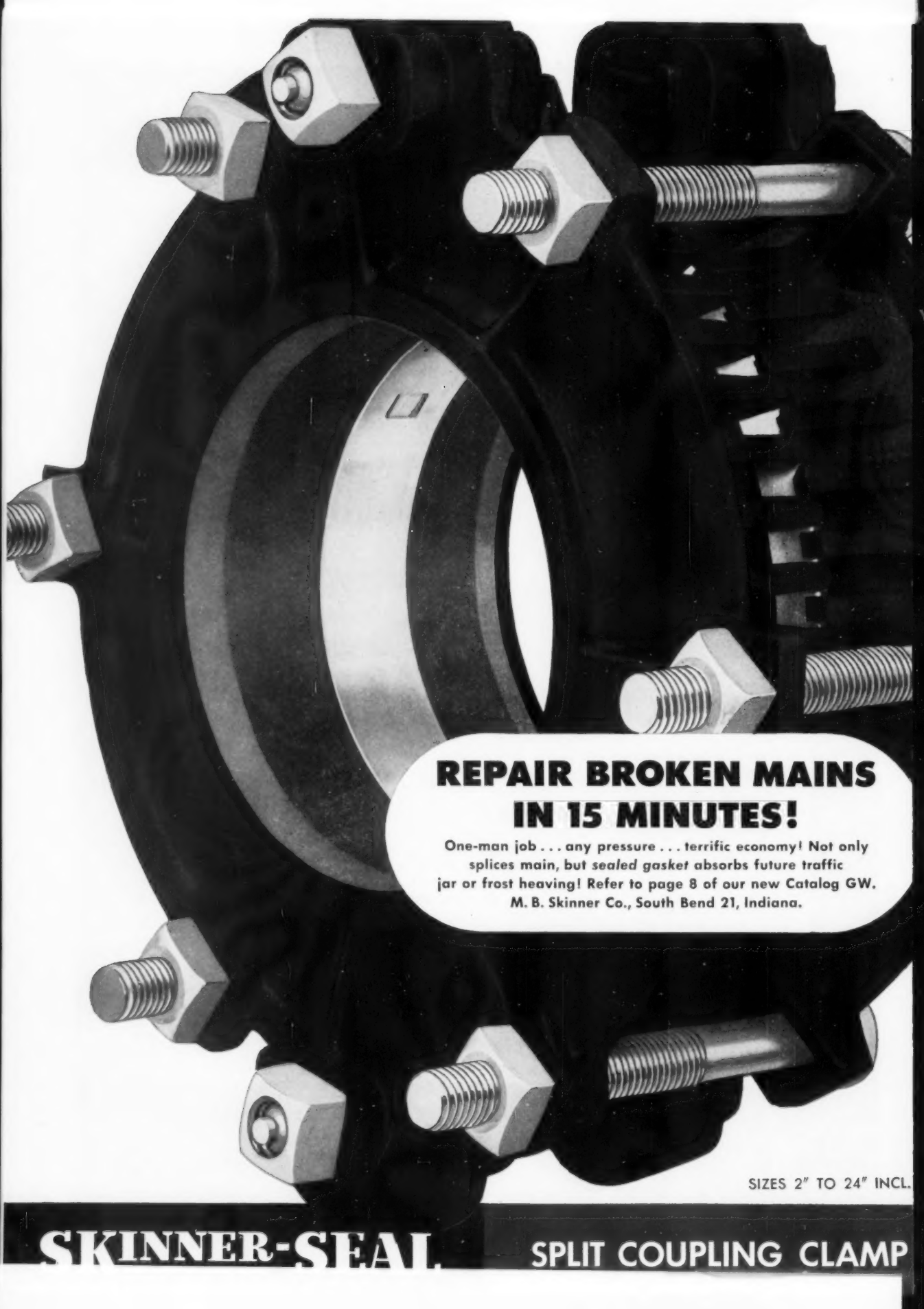
SEND FOR ILLUSTRATED CATALOG

24 YEARS' EXPERIENCE BUILDING GAS CONTROLS

THERMAC

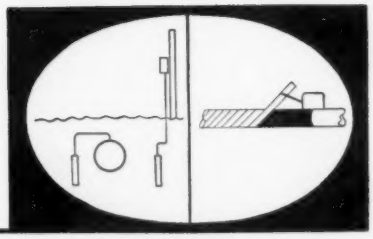
Service is our job — on the spot engineering assistance and immediate delivery.

HM COMPANY 800 East 108th Street • Los Angeles 59, California


REPAIR BROKEN MAINS
IN 15 MINUTES!
One-man job . . . any pressure . . . terrific economy! Not only splices main, but *sealed gasket* absorbs future traffic jar or frost heaving! Refer to page 8 of our new Catalog GW. M. B. Skinner Co., South Bend 21, Indiana.
SIZES 2" TO 24" INCL.
SKINNER-SEAL
SPLIT COUPLING CLAMP

Corrosion Prevention

DISTRIBUTION • TRANSMISSION



Cathodic protection for American Louisiana line

The American Louisiana pipeline extends from the corrosive marshes of southern Louisiana to near Detroit and other points of the Great Lakes region. (See GAS, Oct., 1956, pp. 127-163.) Recently completed, now it will be placed under cathodic protection by a program that will cover its entire length. This is a rather unique achievement in view of the fact that the pipeline system has not yet completed its first year of operation.

Last fall, about 70 miles of the system was placed under protection by cathodic protection crews that followed immediately behind spreadwork. This portion of the line was in some of the most corrosive areas of the marshes.

Two other highly corrosive areas in the strip mining country of Indiana and Kentucky were placed under cathodic protection on the tail of the construction spreads. The three compressor stations completed during the summer of 1956 had cathodic protection systems designed and installed.

Cathodic protection programs at compressor facilities had double objectives. One was to provide corrosion prevention to the underground piping and other buried metallic structures. The other purpose was to study these early installations to evaluate coating resistance of representative sections of the pipeline system and to compute, therefrom, current requirements for the application of cathodic protection systems to the remainder of the facilities.

Cathodic Protection Service (Houston) has the contract for design and installation of the complete cathodic protection program. Essentially, the contract calls for the installation of the necessary equipment to achieve a pipe-to-soil potential of −0.85 v as referred to a copper/copper-sulfate electrode from one end of the pipeline system to the other. Underground components of five compressor stations are included in the program.

Three engineering survey crews have taken to the field. They are currently running additional current requirement checks and obtaining all other data necessary for the detailed design. Material will be ordered for the job as soon as rectifier ground bed sites have been selected and rectifiers sized.

Actual installation will start on the northern end of the line. Crews will work south. They plan to have at least the physical side of the cathodic protection system installed prior to the advance of inclement weather toward the southern portions of the pipeline. It is contemplated that most of the final testing and checkout can be finished prior to heavy weather.

The contract calls for a packaged job. It is one of the largest of this kind ever placed in the pipeline industry.

New coating and application process

A new rubberized asphalt mastic coating is getting its first commercial try-out down in the brackish swamps of Louisiana. An outstanding characteristic of the coating is its flexibility. This property is reported to exceed that for long steel pipelines. Such a coating is particularly adaptable for protective coatings in constructing offshore or other submerged pipelines.

The coating operation is performed on a barge. The entire pipeline operation is likewise accomplished on barges. In practice, it produces a floating pipeline factory.

The job is being done for Southern Natural Gas Co. by Brown & Root Inc. (Houston). Pipeline involved is 12.75-in. OD extending for 27.5 miles from Lake Enfermer field to a Southern Natural transmission trunk in Barataria bay.

Contractor uses five barges. One is a pipe storage craft, joints are lined-up on another, the welding and X-raying is performed on the next barge, and a main barge is used for preparing the pipe for coating and the application of the coating. Still another barge is used as a supply dump for the coating materials.

The lay-barge is a self contained unit for continuously coating pipeline and dropping it in the trench (see GAS, December, 1955, pp. 124 and 126). The asphalt mastic coating is reinforced internally and externally with fiberglass. Thousands of gallons of water are used to cool the hot-applied protective material as the pipe leaves the coating machine. The flexibility of the coating is said to enable the pipe to sag and bend, as is necessary on barge-based pipeline laying operations, without cracking.

The barge-based coating operation was developed by Southern Production Co. on a 200-mile submerged pipeline job for Southern Natural Gas Co. in 1954. However, on that job concrete coating was applied. The new coating is marketed under the trade name Timkote.

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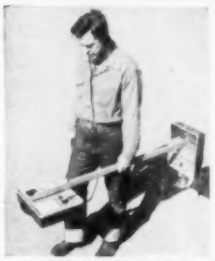

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GAS news

Dominion Natural plans '57 construction program

A $2.5 million expansion program for 1957 is planned by Dominion Natural Gas Co. Ltd., St. Thomas, Ont., doubling the company's output last year.

The 1956 program totaled $1.2 million and included acquisition of the Port Colborne-Welland Gas Co. In addition, 78 new gas wells were drilling during the year with 29 of them producers.

Large supplies of gas are anticipated in 1958, which call for expansion of the company's system.

SoCounties 1957 budget biggest in history

Largest budget for any one year in its 46-year history has been set by Southern Counties Gas Co., Los Angeles. The $24.4-million allotment exceeds by 24 per cent the 1956 high of $19.7 million.

Vice President Jay Davis Jr. also reports that SoCounties expects to add 57,000 new customers to its lines, the third year in a row the company has made provision to add more than 50,000 customers annually. At year-end, the company was serving more than 597,000 customers, a 134 per cent increase since 1946.

Nearly half of the 1957 budget —$12,659,000—has been set aside for equipment to bring gas service to customers not now connected to the company's lines. Altogether, SoCounties expects to add 2000 miles of pipeline of various sizes to its distribution system.

Another major expenditure is the $7.3 million which the company will lay out toward construction of a 241-mile, 30-in. diameter line from the California-Arizona border to Newhall to carry added amounts of out-of-state gas for use in southern California. So-

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See HARDWICK for '57

HARDWICK STOVE COMPANY, CLEVELAND, TENN.

Counties is building the line jointly with its affiliate, Southern California Gas Co.

For replacement of older mains, services, meters and other equipment, the Los Angeles utility will spend $2.6 million.

In general, the budget reflects rate of growth of areas served by the company's eight operating divisions. Fastest growing is the eastern division, headquartered in Pomona, with an expected 19,000 meters, where the company had budgeted $4.2 million.

James N. Land, member of the board of directors of Equitable Gas Co., listens to a curb box locator at a recent display of the Pittsburgh company's safety equipment. Protective devices for both public and employees were displayed in the auditorium. Others in the photo are (from left) James M. Bovard, Sydney K. Schiff, Mr. Land, all directors; Donald B. Beecher, director, vice president and general manager; A. W. Conover, president; and James H. Marks, vice president in charge of operations.

Other divisions and number of meters expected to be added in 1957 along with money budgeted are as follows:

Orange county division, 18,000 meters and $3.8 million; San Gabriel Valley division, 8000 meters and $1.8 million; Ventura county, 4000 meters and $1.3 million; Santa Monica Bay, 4000 meters and $1.1 million; Harbor, 2000 meters and $515,310; Santa Barbara, 1400 meters and $516,355; and northern—headquartered in Santa Maria—1100 meters and $721,000.

Ark-La's interruptible contract battle continues

An Arkansas state senator plans to ask for a legislative investigation of the Arkansas Louisiana Gas Co. unless the state public service commission agrees to hold hearings on the gas company's controversial 3X contracts while the legislature is in session.

After hearing testimony from Ark-La officials, the commission adjourned a hearing on the contracts until April 8, when commercial consumers who are protesting the necessity of such contracts are scheduled to present their case.

The 3X contracts are offered customers in the commercial class and provide for an extra charge of 5 cents per Mcf in return for

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2 NEW

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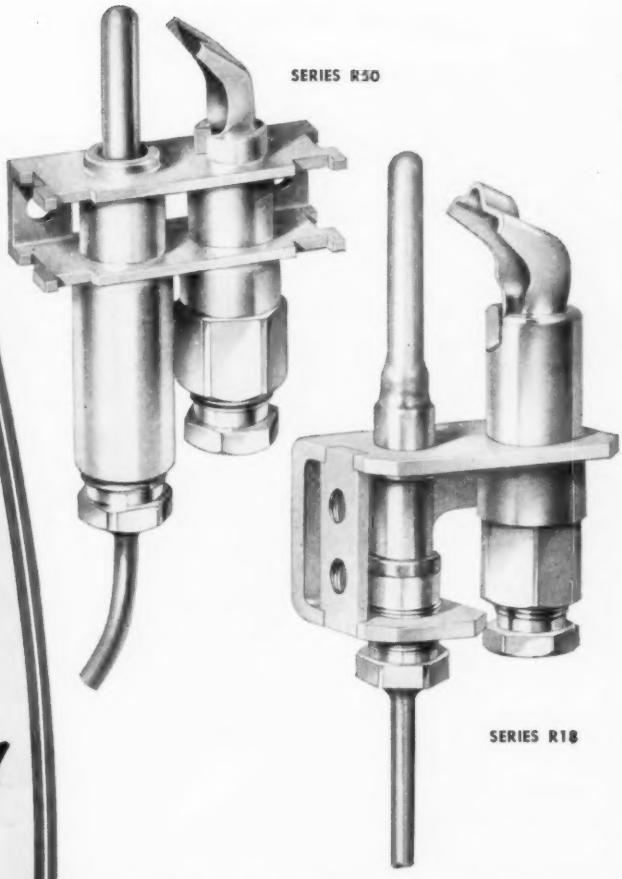

Annulair Series R18 at 700 Btu./hr. and Series R50 at 300 Btu/hr. (with Nat. gas) can be mounted either horizontally or vertically. The single, blue, forked flame heats the thermocouple and ignites the main burner. Each series has three tip angles for greater flexibility. Lint carried into the pilot burner is burned in the pilot flame and carried away by the pilot flame itself. Pilot screens are unnecessary because there is no primary air opening to clog.

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a higher priority in case of a gas shortage. Some users claimed that the gas company tried to force them to sign such contracts by curtailing gas supplies in November. Ark-La officials say there was no coercion and that curtailments were necessary because of an unexpectedly heavy drain on gas supplies.

Meanwhile, the Aluminum Co. of America asked the PSC to issue a restraining order to prevent the utility from curtailing Alcoa's gas supply.

Late in November, Alcoa asked the commission to stop the curtailments and to void Reynolds Metals Co.'s "preferential" contract with Ark-La which guarantees against interruptions of gas service. Alcoa's gas supply was curtailed for four days in November, forcing the company to resort to fuel oil for its boilers. Alcoa alleges that Reynold's gas supply was not curtailed on the same days.

Worcester completes loop begun in 1927

Worcester (Mass.) Gas Light Co. has completed the high pressure gas main loop which now completely encircles the city.

The 25-mile, 8- and 12-in. pipeline project was initiated back in 1927 and was completed late last year at a cost of some $665,000.

With a dozen regulator stations along its route, the line is designed to maintain constant gas pressure. In addition, other lines

Over the hills and through the woods—Worcester's completed new gas belt feeder line now circles the city and gives the area one of the most modern and flexible gas distribution systems in the nation.

now feed out to other suburban cities and towns and to other areas of population growth as well as to new industrial consumers.

The successful completion of the high-pressure loop is especially significant to John P. Lutz, distribution superintendent, who was hired in 1927 and went to work on the first section of the loop. The problem then was to supply the immediate needs of whole areas of the city and the suburbs through the maze of internal low-pressure gas distribution pipelines, while at the same time plotting the best possible locations for the loop line that would one day skirt the perimeter of the whole city.

A valve located every 2500 ft along the entire length of the line adds flexibility to the distribution system. In cases such as the Worcester tornado, these valves could shut off particular areas, circumventing damaged sectors to provide normal service to customers in other locations.

Columbia's reorganization plan moving ahead

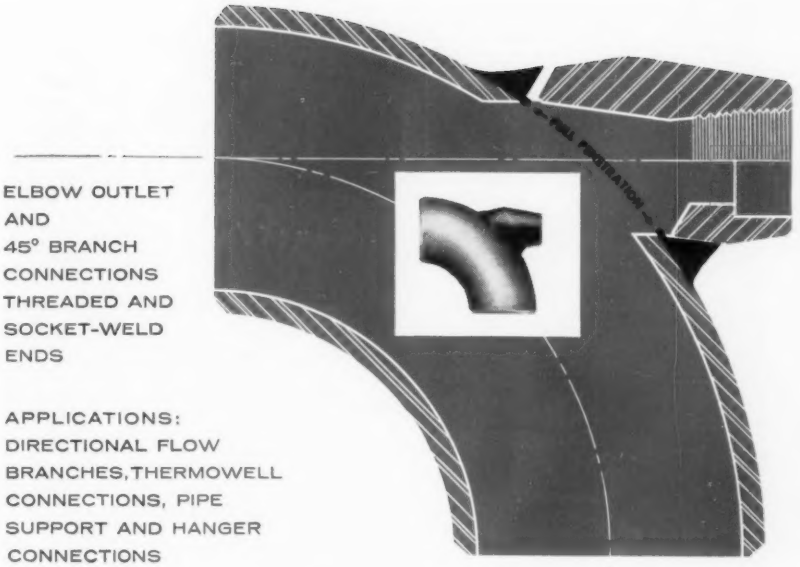
Two important steps in the simplification program of Columbia Gas System subidiaries became effective Jan. 1, following approval by all regulatory bodies concerned.

In one step, the Natural Gas Co. of West Virginia merged into Ohio Fuel Gas Co. Natural Gas operated entirely within the state of Ohio, serving about 90 communities in the eastern part of the state.

In the second step, Kentucky Gas Transmission Corp., a new company, acquired all of the transmission and storage operations of Central Kentucky Natural Gas Co., which will become solely a distribution company. It will serve Lexington, Frankfort, Winchester and seven other communities in Kentucky. Kentucky Gas Transmission will supply gas at wholesale to Central Kentucky and that company's present wholesale customers.

Formation of Kentucky Gas Transmission is a temporary measure. When the transmission and storage properties of each of the System's companies have been similarly separated, the transmission companies will be merged to form a single, system-wide transmission company.

In another simplification move, a hearing was scheduled for mid-January by the New York Public



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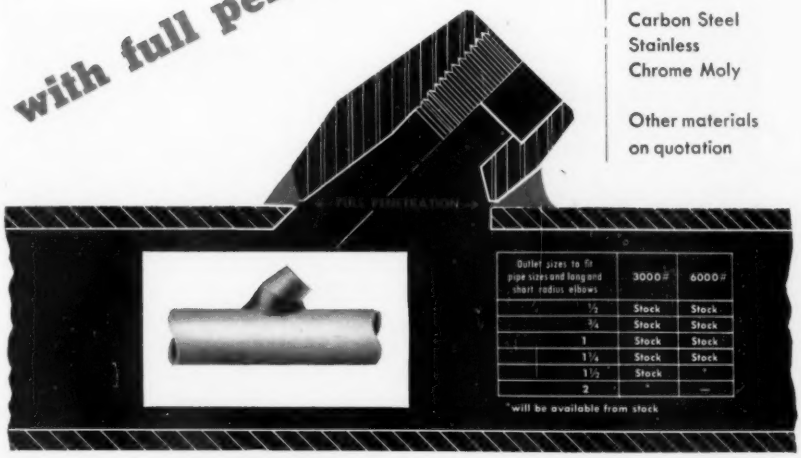

Outlet sizes to fit pipe sizes and long and short radius elbows	3000#	6000#
½	Stock	Stock
¾	Stock	Stock
1	Stock	Stock
1¼	Stock	Stock
1½	Stock	*
2	*	—

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Service Commission on the merger of Binghamton Gas Works and Keystone Gas Co. Inc. Both are retail distribution companies serving gas to some 53,000 customers in the Southern Tier counties of New York. If their merger is approved, the new company will be named Columbia Gas of New York Inc.

BU's monthly appliance sales hit $1 million

For the second time in the merchandising history of Brooklyn (N. Y.) Union Gas Co., appliance sales exceeded the $1 million figure in one month—October.

The first time BU hit the million-dollar mark was in September 1950 when pre-buying caused by the Korean incident helped push sales to $1,039,953. Figure for the most recent record-breaker was $1,026,586, only $13,367 short of the all-time high.

Most outstanding sales accomplishment for the month was the sale of househeating jobs. Oil burner replacement activity continued favorably.

Rockwell subsidiary builds new plant

Construction is under way on a new 35,000-sq ft valve parts plant for Valve Products Inc., a Rockwell Manufacturing Co. subsidiary, in Knox, Ind.

Located on a 20-acre site, the ultramodern plant will be of high-bay construction and modular design, so contructed that further additions can be built in three directions.

According to President W. F. Crawford, Valve Products' new plant will be completed in the first half of this year. It will produce parts for Rockwell-Edward high-pressure, high-temperature valves and Rockwell-Nordstrom lubricated plug valves.

Peoples Natural customers benefit from expansion

With the $7.4 million expected to be spent in 1957, Peoples Natural Gas Co., Pittsburgh, will invest more than $14 million in expansion and general improvement programs during the 1956-1957 period.

The company will invest $3.1 million in its various local distribution areas serving 13 western Pennsylvania counties in 1957. A similar amount was spent in 1956.

Cost of additions and improvements in the greater Pittsburgh area is expected to total $2.4 million during 1956-1957.

Reflecting the continuing heavy demand for natural gas are sales figures showing that Peoples distributed approximately 90.2 billion cu ft of gas during 1956. In view of the expanding market, sales in 1957 are expected to increase to 96.5 billion cu ft. Peoples estimates that its peak daily demand for 1956-1957 will approach or exceed 636 MMcf.

Peoples provided for heavy gas consumption in winter months by storing an all-time high of 14,125,-315,000 cu ft of gas.

Approximately 9000 new domestic househeating customers were added to Peoples lines in 1956 and 7000 more installations will be added this year.

In a stepped-up exploration program, the company had drilled 35 shallow and two deep test wells as of Nov. 1, 1956, with 35 of the wells coming in as producers. Additional gas, based on original open flow figures, made available by the 1956 drilling program, amounted to 51.9 MMcf/day. The production effort will be intensified this year, with 40 shallow and nine deep wells on schedule.

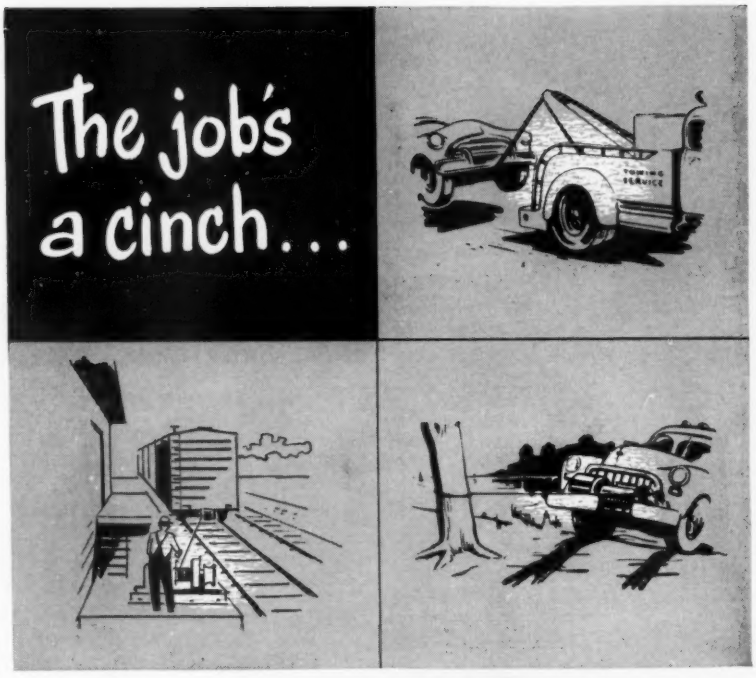
Wyoming PSC rejects boost in gas rates

Wyoming's public service commission has denied the Montana-Dakota Utilities Co. application for rate increases in Sheridan, Buffalo and Kaycee.

The PSC ruled that the company is earning a 6.36 per cent rate of return on its investment in Sheridan and that that amount is sufficient to attract the capital needed to carry on the operations.

The ruling was the result of an extensive hearing on the application. The city of Sheridan and other protestants claimed that Montana-Dakota had computed too small a depreciation reserve and that it was charging off expenses of its appliance selling operations to the utility division of the business.

News continued on page 94



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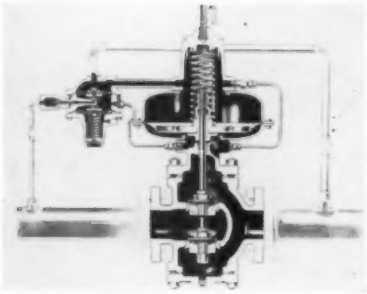


1. Gas regulator

Fisher Governor Co. has in production a new and improved ultra-sensitive gas regulator. These units are for use as intermediate or low pressure district regulators on gas distribution systems and as industrial regulators where the inlet pressure does not exceed 250 psi.

The diaphragm casing for the new Type 208T is made of deep drawn steel and has a large capacity to promote stability and sensitivity of control. A glass-enclosed travel indicator is available which shows the position of the inner valve at all times. The stem connection utilizes a tapered lock nut into which the stem is screwed and clamped to resist shaking and vibration.

Maximum inlet pressure is 250 psi. Controlled pressure range is from 5-in. w.c. to 65 psi.
Fisher Governor Co.

---

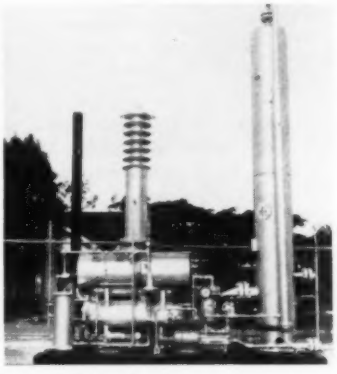
2. Vapor pressure apparatus

A new instrument that increases the accuracy of low temperature fractional analyses by eliminating holdup error and uncertainties in determining cutpoints is announced by Central Scientific Co.

Called the Cenco vapor pressure apparatus, the instrument is used to analyze the binary mixture collected between plateaus of any two fractions and provides information regarding the composition of the original mixture.

Analysis is made of binary mixtures ranging from methane to isopentane, nitrogen content of natural gases, and cutpoint between isobutane and normal butane.

The instrument may also be used in analyzing samples of natural gas for nitrogen, methane and ethane without previous fractionation.
Central Scientific Co.



3. Gas dehydrator

Development of a new line of glycol type gas dehydrators with processing capacities ranging from 1.7 MMcf to more than 60 MMcf of gas daily is announced by Delta Tank Manufacturing Co.

The 42 dehydrators in the new line are designed to reduce water vapor content of natural gas to less than 7 lb/Mcf of gas or depress the water vapor dew point of the gas 65°, whichever criterion is reached first. These performance standards are based on inlet gas temperatures of 100°F or lower.

Delta explains that the water-absorbing capacity of the units is increased through action of Delta's external glycol-gas heat exchanger, which cools the glycol before contacting the gas stream.
Delta Tank Manufacturing Co.

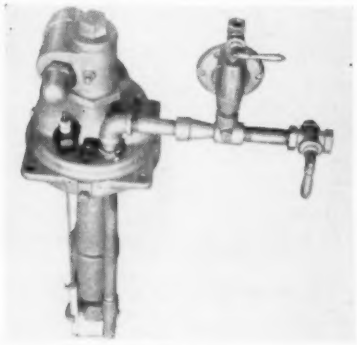
---

4. Crane-excavator

Bucyrus-Erie has introduced a completely new crane-excavator in the 1-yd class which is a readily convertible shovel, dragline, clamshell, crane, or dragshovel. This new model, designated 30-B, is offered with five sizes of crawler mountings. It is also offered as a carrier-mounted transit crane, rated at 35 tons.

Main operating functions of the machine are air controlled. The 30-B crawler machine is available with diesel engine with either direct drive or torque converter

drive, gasoline engine with direct drive, or electric motor.
Bucyrus-Erie Co.



5. Radiant tube burner

Elasticity in radiant tube design for industrial heating has been increased by the introduction of an adaptable new gas burner assembly by Eclipse Fuel Engineering Co.

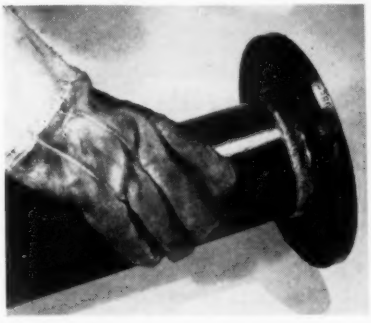
The new RT burner provides a choice of features designed to meet highly specialized designs for radiant tube indirect heating of industrial ovens, furnaces, and muffles. Completely packaged, the RT burners can be installed directly on either metal or ceramic radiant tubes.
Eclipse Fuel Engineering Co.

6. Steelcase meter

American Meter Co. is introducing four new welded steelcase meters of advance design. The new meters are a further development of the American W-60 meter introduced two years ago.

The new models are the W-175 with a rated capacity of 175 cfh designed primarily for minimum ddd applications, and Models W-210 and W-250 for higher ddd applications. The W-300 model will follow at a later date. All the meters are rated with 0.64 sp gr gas at ½-in. pressure drop and 5 psi rated working pressure.

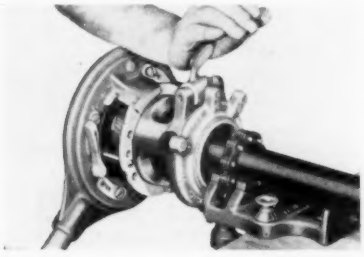
Featured in the new meters are external index box isolated from meter pressure with a gas-tight, frictionless rubber-grommet index shaft seal; removable handhole for easy access to tangent; molded Duramic diaphragms and reinforced flag rods designed to give trouble-free service for the life of the meter.
American Meter Co.



7. Welding neck flange

The recently introduced Tube Turn 125-lb taper face, lightweight welding neck flange offers technical and cost advantages where the lighter schedule of pipe must be connected to 125-lb cast iron valves and other equipment.

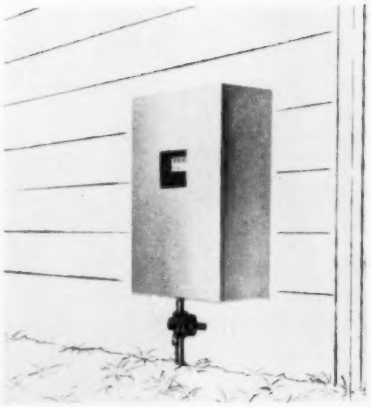
The new flange is rated at 125 lb for water, oil and gas service. It matches 125-lb cast iron flanges and valves made to ASA B16.1, and the bolt circle and drilling are the same as employed for ASA 150-lb standard steel flanges.
Tube Turns



8. Workholder

A new True-Centering Workholder has been announced as an improvement on the Ridgid 65R pipe threader. According to Ridge Tool Co., the new TC workholder guarantees threads which are always straight and true.

Even if pipe is over or under size, the 65R with the new attachment assures a perfect thread because all three workholder jaws close at one time.
Ridge Tool Co.



9. Meter housing

An adjustable metal gas meter housing for outdoor gas meters has been introduced by the Bel Echo Metal Products Co.

The housing comes in two sizes: 16 in. x 12 in. x 29½ in. and 18 in. x 12 in. x 29½ in., and is said to fit most standard size meters. A glass window allows easy reading, and the unit can be mounted directly to the meter or bolted to the house.
Bel Echo Metal Products Co.

10. Meter parts

Two new products for small meters have been added to Lancaster Meter Parts Co.'s line.

Shown here is the complete main movement assembly, which includes valve crank, lower tangent, and adjustable diaphragm links assembly. It can be quickly installed and, according to Lancaster, assures a perfectly centered drive shaft with all related parts correctly positioned for maximum accuracy. The diaphragm links can be easily adjusted so the "in" and "out" stroke can be divided for correct balanced stroke of both diaphragms.

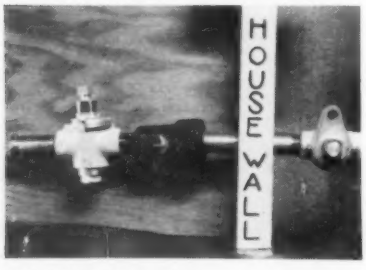
The other product is an index drive assembly, which features an adjustable worm axle dog and quality hard metal parts.
Lancaster Meter Parts Co.

11. Moisture monitor

Monitoring water content in gas transmission lines is one of the applications of a new portable instrument available from Consolidated Electrodynamics Corp. It accurately measures minute quantities of moisture in gaseous mixtures.

Called the Type 26-301 moisture monitor, it is expected to solve many problems encountered in research, quality control, and process efficiency. It will measure water content accurately down to 1 ppm, and permit precise meter readings over the full-scale range of 0 to 1000 ppm by means of a five-step attenuator.

Consolidated Electrodynamics



12. Shutoff valve

The Gas-Phuse, an automatic gas shutoff valve suitable for installation in high pressure gas service lines, is now available in a Dresser Style 90 male adaptor for location outside the building to be protected. So installed it provides a parting point for ruptured lines.

The device closes on rupture due to diggers, bulldozing, etc., and also on excessive flows from large seals. It is sensitive to differential pressure caused by increased gas flow, which causes the stainless steel ball to leave the magnet—the creator of the differential requirement—and to cover the discharge orifice, where it is held by inlet pressure.

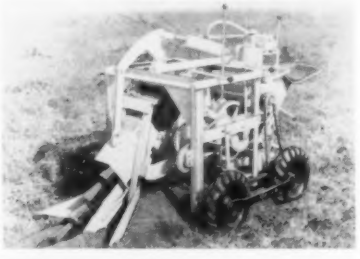
Eastern States Supply Corp.

13. Built-in range

Oakland Foundry's new free-standing oven-broiler and 4-burner range units are designed for island or built-in installation and are part of the new line of completely packaged kitchens produced by the company.

The fully automatic oven (16 or 20 in. wide) and broiler unit are located at a convenient working height, with large storage compartment beneath on a recessed base. The entire unit is engineered and insulated for cool sides and top, stands 5 ft high, is 24 in. wide and deep, and comes with back recessed for use of flexible connectors. Matching snap-on rear panel is available for island installations.

Oakland Foundry Co.



14. Power ditcher

The new model Pow-R-Ditcher, W-2, from Vermeer Manufacturing Co. is the smallest of the Vermeer ditchers and has been developed to answer the need for a narrow, shallow ditch.

With a digging width of 2½ to 4 in. wide, the new W-2 will dig to a depth of 36 in. at a speed of 1 ft to 10 ft per minute.

Powered with either a 23B Briggs Stratton or a Wiseonsin AEN engine, the ditcher's 3-speed transmission with a reverse gear allows a variety of digging speeds and transport speeds up to 2½ miles/hr.

Vermeer Manufacturing Co.

15. Shutoff valve

Watts Regulator Co.'s new shutoff valve is a self-contained device independent of all other operating controls. The No. 500 valve provides protection against overheating water in the domestic hot water supply system by automatically shutting off the gas supply in the event water temperature reaches 210°F. The valve must be manually reset.

The valve comes equipped with 4-in. extension thermostat, but it is available with 6-, 8-, or 10-in. extensions.

Watts Regulator Co.

---

16. Temperature regulator

A new safety-type temperature regulator has been added to the line of self-powered control instruments manufactured by the Fulton Sylphon division.

Designated No. 997 temperature regulator, it will close automatically to prevent overheating and possible damage to products in process in the event the thermostatic unit is accidentally damaged.

The manufacturer recommends the No. 997 for temperature control of industrial processes, storage or instantaneous water heaters. Equipped with reverse-acting valves, the regulators are suitable for the flow control of cooling water

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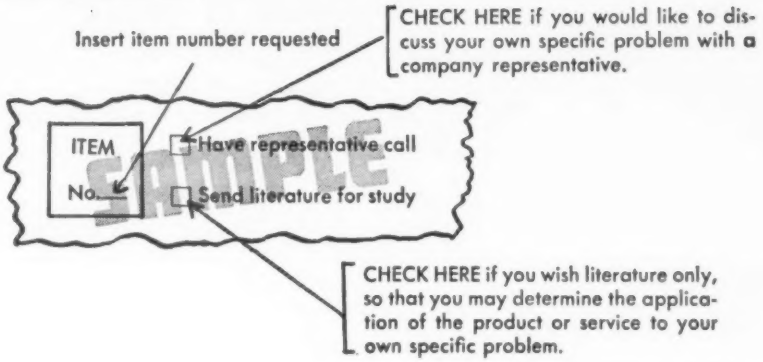
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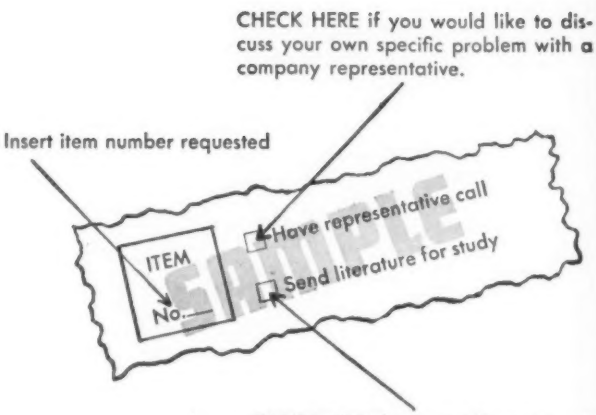
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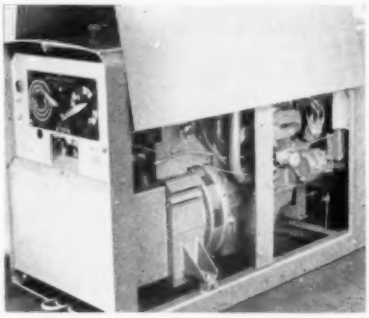
to transformers, internal combustion engines, air compressors and degreasers.
Fulton Sylphon Division

17. Concrete saw

Several new protective features have been added to the Wisconsin engines that power Clipper Manufacturing Co.'s 36- and 25-hp concrete saws.

Both the C-360 and C-250 models are now equipped with exhaust valves and inserts that are faced with Stellite, an extra hard metal, and positive valve rotators, which cause the valve to turn approximately 6° each time they are opened.

In addition, the concrete saws now include an air pre-cleaner and a rotating screen. The pre-cleaner is mounted ahead of the oil bath and traps dust and grit floating in the air. The rotating screen is fastened to the flywheel and helps to keep sludge from building up on the flywheel in the air passages.
Clipper Manufacturing Co.



18. Engine-driven welder

General Electric's welding department is producing a new engine-driven welder with battery start and direct coupling between engine and generator.

Available in 300- and 400-amp models, the welder includes reversing switch, battery start and side panels as standard equipment. It is constructed of extra heavy steel and has no projecting generator or controls.
General Electric Co.

TRADE LITERATURE

19. Specification sheet

A new four-page Product Specification (E-65-5) from Bailey Meter Co. describes the Heat Prover combustion analyzer. Operating and physical characteristics are provided, together with a list of accessories and helpful ordering information.
Bailey Meter Co.

20. Valve control bulletin

E-I-M Co. has published a new bulletin (E-1156) which describes the company's Futronic valve control, an all-electric unit specifically designed for modulating, regulating and throttling services. The eight-page publication presents drawings and photographs together with specifications on the control.
E-I-M Co.

21. Air release valve bulletin

A new line of air release valves from V. D. Anderson Co. is presented in Bulletin 856. The literature describes and explains the operation of these heavy duty valves which are made for pressures up to 500 lb. Features mentioned are the special cast metal housing which assures leak-proof service, valve and seat made of corrosion-resistant bronze, and a long-wearing float.
V. D. Anderson Co.

22. General stock catalog

Fischer & Porter Co. has just published a 32-page catalog describing the company's products. Included in the catalog are descriptions and prices on indicating, recording, controlling and transmitting instruments for flow, pressure and density.
Fischer & Porter Co.

23. Derrick catalog

Holan Corp.'s new Series 6700 "bow-legged" power derrick is described in a new catalog. The four-page publication gives capacities and heights in various working positions, dimensions, action photos, and details on various operating features of the new 8000-lb capacity derrick.
J. H. Holan Corp.

24. Metering publication

Metering and testing equipment products from Oil Metering & Processing Equipment Corp. are covered in a new 12-page catalog. Specifications, operating procedures and applications are presented on metering separators, Vol-U-Meters, well testers, automatic well testing systems, automatic custody transfer, automatic lease equipment, Weigh-O-Matic meters, and metering free water knockouts.
Oil Metering & Processing

25. Vent booklet

A comprehensive guide, full of informative, tested gas vent installation data—with diagrams, sketches and tables—has been published by William Wallace Co. Featured in the 16-page booklet are eight tables covering Metalbestos double-wall gas vent pipe sizes from 3-in. through 12-in. interior diameters.
William-Wallace Co.

26. Control bulletin

A new eight-page bulletin (J-100) describes the Jordan Co.'s electrical remote positioning controls for both pushbutton and automatic operation. The control features a new shaft-mounted control gearmotor for valves and variable speed drives to provide remote or automatic flow, speed, proportion and tension control.
Jordan Co. Inc.

27. Trencher bulletin

Photographs and drawings of Parsons' improved Model 155 Trenchliner are incorporated in a new 16-page catalog from the company. Principal construction and application features of the 155 in general utility work are included in the catalog.
Parsons Co.

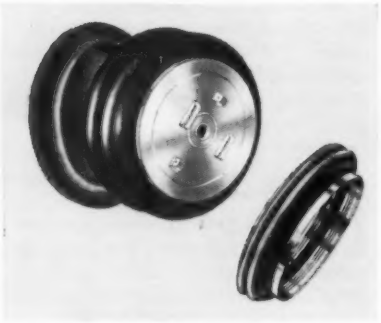
28. Pallet unloader bulletin

The Alvey De-Palletizer, an automatic pallet unloader, has been designed to receive pallet loads of cases and automatically unload each pallet onto a conveyor line. The unloader, developed by Alvey Conveyor Manufacturing Co., is illustrated and described in detail in a new engineering bulletin (F-225).
Alvey Conveyor Manufacturing

29. Trencher bulletin

The Cleveland 80W—a three-way machine for the construction and utilities fields—is the subject of a new 12-page, two-color bulletin published by Cleveland Trencher Co. Twenty-eight on-the-job action photos demonstrate the operations of the 80W as it performs the related functions of pipelaying, backfilling and tamping. The text includes case history reports on the three operations.
Cleveland Trencher Co.

What's inside makes a big difference!



A "jumpy", inaccurate diaphragm in your meter plays costly tricks on good will and revenue.

Using Vulcan Synthetic Diaphragms takes the guesswork out of metering—you *know* you have dependable, sensitive, accurate diaphragm action.

Specify Vulcan . . . and be sure

Another REEVES VULCAN RUBBER PRODUCT

REEVES BROTHERS INC.

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Gas Meter Diaphragms
Diaphragms for Regulators & Controls

GAS people

Robert Miller
Pacific Lighting

Robert Hornby
Pacific Lighting

The board of directors of Pacific Lighting Corp., San Francisco, has elected ROBERT W. MILLER chairman of the board and ROBERT A. HORNBY president of the corporation. Mr. Miller has been president of Pacific Lighting since 1940. His elevation to board chairman fills a post vacant since the death of the company's founder, C. O. G. Miller, in 1952. Mr. Hornby, who in recent years has been operating head of Pacific Lighting Gas Supply Co. in Los Angeles, has been the corporation's chief liaison officer with the distributing subsidiaries, Southern California and Southern Counties Gas companies and Pacific Lighting Gas Supply.

JOHN WILKINSON has joined Telsco Fittings Division, Dallas, as sales manager. Most recently he was associated with the Dallas office of White Motor Co.

E. WAYNE CORRIN has been elected a director of Consolidated Natural Gas Co., New York. Mr. Corrin is president of two Consolidated subsidiaries, Hope Natural Gas Co. and the River Gas Co.

SOL W. WEILL has rejoined the Geo. D. Roper Corp., Rockford, Ill., as eastern promotional manager, working out of the Philadelphia office.

John Wilkinson
Telsco

Wayne Corrin
Consolidated

CUT COSTS ON UNDERGROUND PIPING JOBS

...with a GREENLEE PIPE PUSHER

Installing pipe underground is quick and simple this way. With a GREENLEE Hydraulic Pipe Pusher *one man* pushes pipe through the ground—under streets, railways, walks, lawns, floors. Saves time, cuts costs through elimination of extensive ditching as just a short trench accommodates the Pusher. No tearing up of pavement, lawns, floors . . . eliminates tunneling, back-filling, tamping, repaving. Cuts job time to a fraction. Pusher often pays for itself through timesavings on first job or two.

No. 790 GREENLEE PUSHER For 3/4 to 4-inch pipe. Six speeds—5,600 to 40,000 lbs. pushing pressure.

No. 795 GREENLEE PUSHER For pipe larger than 4-inch, concrete sewer pipe, large drainage ducts. Six speeds - 25,000 to 150,000 lbs. pushing pressure.

POWER PUMP For both sizes of GREENLEE Pushers. Pushes pipe at rate of two feet per minute.

TOOLS FOR CRAFTSMEN
GREENLEE

Write today for descriptive literature. Greenlee Tool Co., 1942 Columbia Ave., Rockford, Ill., U. S. A.

Heath Survey Consultants Inc., Wellesley, Mass., has promoted G. RICHARD WEAVER to district supervisor. He will head Health operations in northern California, Idaho, Oregon, Washington, and British Columbia.

JAMES B. COOK, JR., has been named sales manager of Hays Manufacturing Co.'s General Products division. He will headquarter in Pittsburgh.

ROY T. RICHARDS, general superintendent of system gas for Arizona Public Service Co., Phoenix, retired on Dec. 31, 1956, after more than 36 years with the company.

J. B. Cook, Jr.
Hays

Palmer Epler
Rockland Light

Clyde Cornell
Anchor

R. C. Ockerman
Anchor

PALMER Y. EPLER has been appointed assistant treasurer and assistant secretary of Rockland Light & Power Co., Nyack, N. Y. With the company since 1927, Mr. Palmer was formerly plant investment department manager and chief accounting officer.

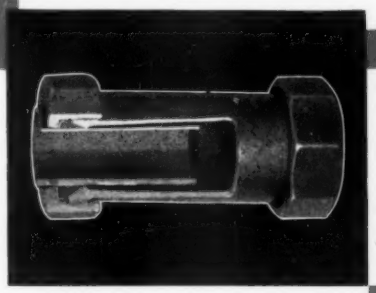
Anchor Petroleum Co., Tulsa, has named CLYDE H. CORNELL manager of its San Francisco office and ROBERT C. OCKERMAN manager of the Long Beach, Calif., office. These are both new positions. C. L. PARKHILL, JR., who has been manager of Anchor's western division, has resigned.

PATRICIA HENDRICK has joined Harper-Wyman Co., Chicago, as

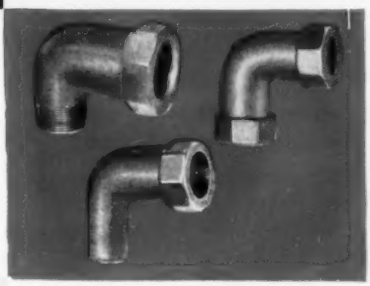
NORMAC

Couplings, Sleeves and Fittings for ☆ UNIFORMITY ☆ DEPENDABILITY ☆ ADAPTABILITY

Normac gas distribution products are engineered and manufactured to meet every requirement of modern gas distribution. Write today for catalog.

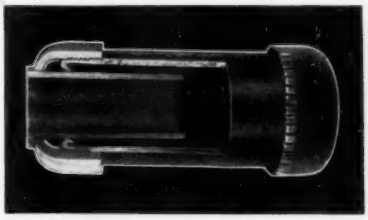


NORMAC COUPLINGS
Normac malleable couplings and sleeves offer the ultimate in deflection and strength with a center wall thickness greater than the wall thickness of the service pipe on which they are used. Every Normac fitting is individually air tested.



COMPRESSION-END "ELLS"
Normac ells of all types incorporate every feature of the Normac coupling plus full coupling depth.

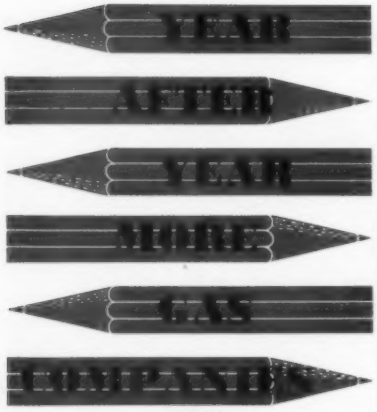
COMPRESSION-END SERVICE "TEE"
Full coupling depth. Special threads on male end prevent dropping into old hand taps.



NORMAC #50-A STEEL COUPLINGS
Manufactured from extra heavy wall pipe. Couplings are available with either seamless or welded centers in sizes from ¾" to 1½" inclusive. 10" and special length centers available.

Normac also manufactures a complete line of red brass fittings in O.D. sizes: ⅝", ⅞", 1⅛", 1⅜"—and a complete line of insulated couplings and fittings.

NORTON-McMURRAY MFG. CO.
122 South Michigan Avenue — Chicago 3, Illinois



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HEATH
Leakage Control Surveys

than all other surveys—combined!

Big reason for the acceptance of Heath Leakage Control Surveys is their thoroughness. Only a thorough survey is an *adequate* survey.

Heath "V" *Type Vegetation and Soil Surveys* provide complete control for residential and rural areas.

"W" *Type Surveys* cover commercial areas, street and building inspections.

Many companies start with one type of Heath Survey, then combine the two types for an *Overall* leakage control program which accurately locates and classifies leaks in *all* areas.

Write for complete information about the Heath Leakage Control Survey Method best suited to your needs

HEATH
Survey Consultants, Inc.
573 WASHINGTON ST., WELLESLEY 81, MASS.

people • *Continued*

Bruce Kinney
Southern Union

W. R. Curley
Royston

home service director. She will supervise the operation of a fully equipped kitchen in the company's general offices and will direct all home service activities.

BRUCE KINNEY has been appointed sales manager for the northwestern New Mexico district of Southern Union Gas Co., Dallas. He will headquarter in Farmington.

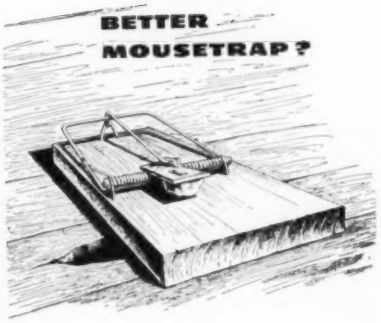
Recent promotions at South Jersey Gas Co., Atlantic City, include C. L. CRANMER, JR., to superintendent of operations, Cumberland division; B. W. CONOVER, general superintendent of operations; F. H. DARLINGTON, vice president in charge of operations; and C. L. SILVIUS, superintendent of operations, Atlantic City division.

With the consolidation of its sales offices serving the Texas, Louisiana, Arkansas and Mississippi area, Royston Laboratories has named W. R. CURLEY regional manager for the entire area. Mr. Curley, who will headquarter in Houston, was most recently the Royston representative in Monroe, La.

JOHN H. MULLIKEN, president of the Gilbert & Bennett Manufacturing Co., Georgetown, Conn., has been elected a director of the Connecticut Light & Power Co., Berlin, Conn.

C. C. WHITTELSEY has been elected president of Ford, Bacon & Davis Inc., New York, succeeding E. S. COLDWELL, who will actively continue as chairman of the board of directors. Mr. Whittelsey was formerly executive vice president.

Hoil Engineering Co., Tulsa, has added two key men to its sales and service personnel. FRANK P. DE LARZELERE is with the utility divi-



THE story of the reward for a better mousetrap is proverbial. But the fact remains that most mice are still caught by this simple, economical and effective contraption.

Gas purification is a parallel case.

Iron Sponge, preferred for the removal of H_2S seventy-five years ago, is still preferred today. And for these same reasons . . . simplicity, economy and effectiveness. Iron Sponge operates with high efficiency at high or low pressures, has excellent capacity and activity, gives long service between foulings and is simply and quickly regenerated.

CONNELLY, *Inc.*

3164 S. California Avenue
Chicago 8, Illinois
Elizabeth, N. J.

R. B. Kitzmiller
Rockwell

A. J. Komich
Rockwell

sion, and A. J. HALE is the new contact representative.

ROBERT B. KITZMILLER has been named Los Angeles district sales manager and A. J. KOMICH has become gas products manager of Rockwell Manufacturing Co.'s meter and valve division, Pittsburgh.

FRANK SWEARINGEN has joined Washington Natural Gas Co., Seattle, as advertising promotion manager. A veteran utility promotion man, Mr. Swearingen will handle the company's expanding sales promotion program. Washington Natural has announced the retirement of CLARENCE E. LASHER, effective April 30. Succeeding him as Everett manager will be STANLEY L. WINTER, industrial and heating supervisor of the southern division.

DANIEL S. HEFFRON has been elected vice president of the Quick-Way Truck Shovel Co., Denver. Mr. Heffron has been director of sales for Quick-Way since 1944, when he joined the company.

WILLIAM E. FERGUSON, vice president and manager of production for Ohio Fuel Gas Co., Columbus, and FRANK S. WILLIAMS, vice president in charge of distribution, have been elected directors of the company.

DANIEL C. GILLESPIE has been promoted to head of the methods department and the central billing

Frank Swearingen
Washington Natural

Daniel Heffron
Quick-Way

because it fits more jobs...

the Cleveland 92 "Baby Digger" digs more trench ... in more places ... at less cost

THAT TREE LAWN is really *narrow* but the compact maneuverable 92 is doing a neat job of digging from driveway to driveway. The operator sets in and lifts out the digging wheel with speed and safety because the 92 gives him full job visibility and fast accurate boom hoist control. Synchronized wheel and conveyor speeds permit precision placement of spoil. No damage to curb, sidewalk or driveways either, thanks to the 92's perfect balance on long, smooth, non-clog crawlers—a real public relations asset.

- ★ Only 54" wide over crawlers
- ★ Digs 10" to 20" wide
- ★ Digs to 5' deep
- ★ Power-shift conveyor
- ★ Reversible discharge
- ★ Digs all soils
- ★ Digs in any weather
- ★ Portable, at legal limit speeds

THE CLEVELAND TRENCHER CO.

20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

Good Everywhere

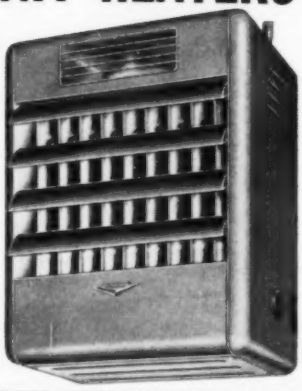
IN THE GREATEST VOLUME YEAR OF ALL TIMES

YOU GET MORE THAN YOU PAY FOR IN . . .

Peerless GAS FIRED UNIT HEATERS

Here's the ultimate in value . . . an entirely NEW line of Fan and Blower Models . . . new low price . . . doubled production schedules . . . fast deliveries . . all combine to help you capture your share of this year's vast volume.

DON'T DELAY — WRITE FOR DETAILS TODAY.



Peerless
MANUFACTURING CORP. - Louisville 10, Ky.

"Best Ditcher For Irrigation Lines and Gas Mains"

"My 4T Pow-R-Ditcher is the best machine I've ever used for irrigation lines and gas mains for the Kansas Power & Light Co. It's the finest small ditcher on the market for all-around performance and low cost ditching."

D. Catherman
SALINA CRANE & SHOVEL CO.
Salina, Kansas

VERMEER MIDGET DITCHER DIGS MORE . . . COSTS LESS

Here's just the machine for laying gas pipe, service lines and digging foundation footings. One man operation. Very maneuverable for those "tight spots." Only 48" wide, 6' high, 13' long. Digs 6" to 14" wide and can be transported in a pickup truck. Thousands in use. Write for complete information.

Some Excellent Distributor Territory Available

VERMEER MFG. CO., Pella, Iowa

people • *Continued*

department of Columbia Gas System Service Corp. in Columbus, Ohio. He succeeds R. J. FARLEY, who has been elected secretary and treasurer of the Preston Oil Co. and a member of Preston's board of directors.

CHESTER S. BEARD has joined General Controls Co., Glendale, Calif., as chief engineer in the industrial and instrument division. He was formerly with Foster Engineering Co., Union, N. J.

Spokane (Wash.) Natural Gas Co. has named HOWARD M. HIBLER manager of distribution and C. J. MELROSE chief engineer. Mr. Hibler was formerly assistant project manager of the Spokane project of Fish Service & Management Corp. and Mr. Melrose has been Spokane's general superintendent for a number of years. Most recently he has been manager of operations.

LEWIS R. KNERR has been named manager, rates and evaluation, of San Diego (Calif.) Gas & Electric Co. This new post was created to coordinate the activities of the valuation and rate departments.

Several appointments have been announced by Cascade Natural Gas Corp., Seattle. PHIL F. TOMAN, who has been general sales manager for the past three years, is now vice president, sales. O. MARSHALL JONES is now vice president, finance, and EDWARD A. OSBORN is controller. CAROLYN BYRON has joined Cascade as home service director.

FRED C. FOY, president of Koppers Co., Inc., has been elected to the board of directors of H. K. Porter Co., Inc.

GLEN M. GARVIN, formerly manager of the Kamloops (B.C.) Board of Trade, has been appointed sales promotion manager for the Inland Natural Gas Co. Ltd. at Kamloops. H. LAUB will be southern area sales manager.

WILLARD F. ROCKWELL JR., president of Rockwell Manufacturing Co., Pittsburgh, has been named co-chairman of a special 14-member committee appointed by Pennsylvania Gov. George M. Leader to work out a solution to the state's financial problems.

RICHARD L. LOEFFLER has been appointed assistant manager of the marketing research department of

Phil F. Toman
Cascade

O. Marshall Jones
Cascade

the L. O. F. Glass Fibers Co., Toledo.

Northwestern Utilities Ltd., Edmonton, has appointed B. F. WILLSON as vice president, operations, and M. E. STEWART as general manager.

JOSEPH A. HEIMAN has been named purchasing agent for Rockwell Manufacturing Co.'s Instrument division at Tulsa. He is succeeded as senior buyer in Rockwell's general purchasing department at Pittsburgh by JAMES N. HUBER.

JOHN B. OLSSON has been promoted to manager of Brooklyn (N.Y.) Union Gas Co.'s commercial department.

CLIFFORD A. STOCKHOFF has been appointed sales manager of the Albuquerque (N.M.) district of Southern Union Gas Co., replacing H. G. CARL, who has transferred to Flagstaff, Ariz.

Deaths

A. M. RIPPEL, head of the natural gas department of Phillips Petroleum Co., Bartlesville, Okla., was killed in December when a company plane crashed southeast of Bartlesville. Seven other Phillips men died in the crash: W. C. REED, C. W. BINCKLEY, DONALD YOUNG, and D. F. MAYFIELD, all members of Mr. Rippel's staff; GEORGE L. SNEED, company attorney; and JOE BOWER, pilot, and R. E. ULRICH, co-pilot.

VICTOR MAUCK, until a year ago chairman of the boards of John Wood Co. and Nicolet Industries Inc., died on Dec. 2. He was 82. Mr. Mauck was associated with John Wood for 65 years, joining it in 1891 as office boy; eight years later, at the age of 26, be bought it. One of the founders of the American Welding Society, Mr. Mauck was the first to perfect the continuous welding of tube steel in large diameters and heavy gauges.

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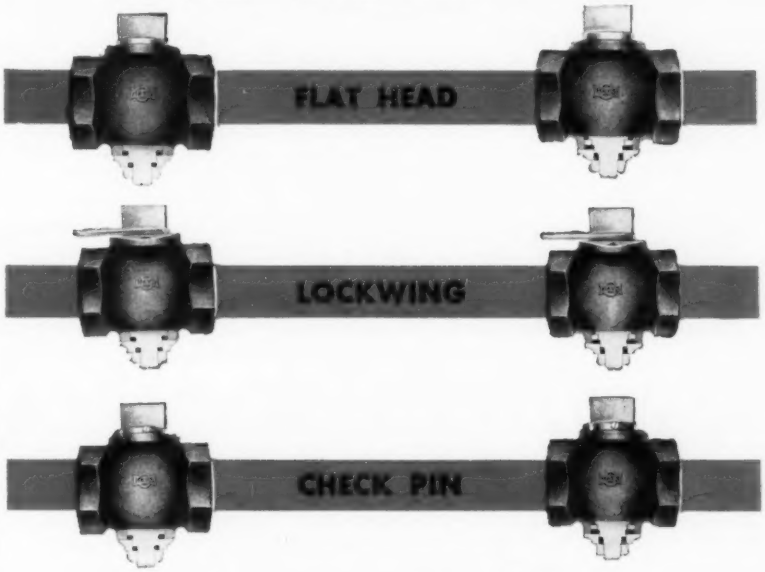
HAYS STOPS FOR SERVICE LINES · METERS · APPLIANCES

REGULAR PATTERN — Full Range of Sizes — "KEY-LOK" TAMPER PROOF

Iron Body with Brass Plug ... Black or Galvanized



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Quality Proven by Supplying the Gas Industry for Over 80 Years

Hays also manufactures a full line of all brass stops

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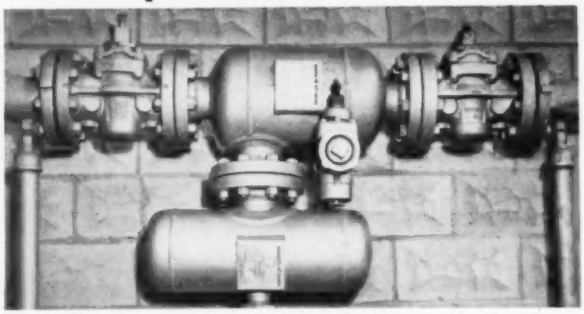
FOR REAL SCRUBBING ACTION use patented Hi-eF PURIFIERS!



Remove virtually 100% of all dust, dirt and oil particles from natural gas with patented, maintenance-free Hi-eF Purifiers. Ideal for scrubbing out all dust and oil particles after oil bath scrubbers. Contains no moving parts, filters or screens. Nothing to maintain yet efficiency is guaranteed virtually 100%. Write for full details today.

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division of International Basic Economy Corporation
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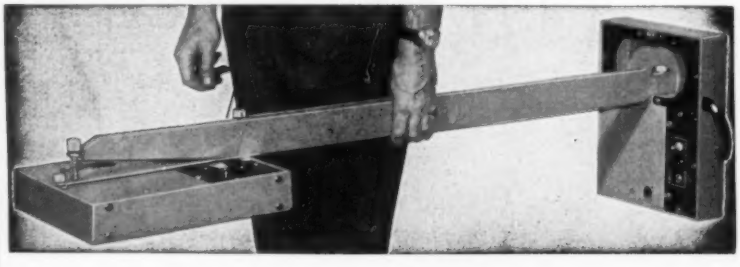
The WILKINSON LINE LOCATOR

SEES AND TELLS

It will instantly locate all subsurface pipes, cables and such, and determine their depth too. The etched circuitry, our latest innovation, assures better quality control and performance than the customary hand wiring method. You can avoid damaged structures and loss of time with the Wilkinson Line Locator.



The new loop antenna is designed for greater selectivity and the printed circuitry eliminates the usual variations. These improvements make this instrument outstanding.

Our instrument cases are now made with wear resisting phenolic material.

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GAS calendar

February

- 3- 5. . 27th Annual Mid-Winter Conference, Public Utility Buyers Group, National Association of Purchasing Agents—Brown Hotel, Louisville, Ky.
- 4- 6. . AGA Home Service Workshop—King Edward Sheraton Hotel, Toronto, Ont., Canada.
- 8. . NEGA Commercial-Heating-Industrial Division—The Sheraton Biltmore, Providence, R. I.
- 13-15. . Eighth Annual Tulsa Corrosion Short Course for Pipeliners—Mayo Hotel, Tulsa.
- 21-22. . SGA Accounting Management Roundtable Conference—Roosevelt Hotel, New Orleans.
- 21-22. . SGA Sales Executives' Conference—Roosevelt Hotel, New Orleans.
- 27-28. . Gas Conditioning Institute (Sponsored by University of Kansas Extension & Southwest Kansas Petroleum Industry) — Randall's Cafeteria, Liberal, Kan.

March

- 7- 8. . SGA Transmission Management Roundtable conference—Roosevelt Hotel, New Orleans.
- 7- 8. . SGA Distribution Management Roundtable Conference—Roosevelt Hotel, New Orleans.
- 11-15. . National Association of Corrosion Engineers—Kiel Auditorium, St. Louis, Mo.
- 21-22. . New England Gas Association Annual Meeting—Hotel Statler, Boston.
- 25-27. . AGA General Management Section — Edgewater Gulf Hotel, Edgewater Park, Miss.
- 25-27. . Mid-West Gas Association — Hotel Nicollet, Minneapolis.
- 28-29. . Oklahoma Utilities Association Annual Convention—Tulsa.

April

- 8-10. . National Conference of Electric and Gas Utility Accountants—Sheraton-Park Hotel, Washington, D. C.
- 8-10. . GAMA Annual Meeting — The Greenbrier, White Sulphur Springs, W. Va.
- 8-11. . AGA Distribution, Motor Vehicles and Corrosion Conference —Rice Hotel, Houston.
- 16-18. . Petroleum Industry Electrical Association & Petroleum Electric Supply Association 29th Annual Convention & Exhibit—Shamrock-Hilton Hotel, Houston.
- 16-18. . Southwestern Gas Measurement Short Course—College of Engineering, University of Oklahoma, Norman.
- 16-18. . AGA Sales Conference on Industrial and Commercial Gas—Jung Hotel, New Orleans.
- 24-25. . PCGA Accounting Section Spring Conference — LaPlaza Hotel, Carmel, Calif.

24-26. .Natural Gasoline Association of America 36th Annual Convention Rice Hotel, Houston.

25-26. .Indiana Gas Association—French Lick-Sheraton, French Lick, Ind.

29-May 1. .Southern Gas Association Annual Convention — New Orleans.

May

Natural Gas & Petroleum Association of Canada—Hotel London, London, Ont., Canada.

6- 7. .AGA Residential Gas Section Eastern Sales Conference—Hotel William Penn, Pittsburgh.

7- 9. .AGA Research & Utilization Conference—Cleveland, Ohio

8-10. .Joint AGA-PCGA Gas Supply, Transmission & Storage Conference—Mark-Hopkins Hotel, San Francisco.

19-22. .TIPRO Convention — Galvez & Bucaneer Hotels, Galveston, Texas.

20-22. .AGA Mid-West Regional Gas Sales Conference — Edgewater Beach Hotel, Chicago.

20-22. .AGA Chemical, Engineering and Manufactured Gas Production Conference — Balmoral Hotel, Miami Beach, Fla.

20-23. .29th Annual Exhibit of the Oil & Gas Power Division of ASME—Kentucky Hotel, Louisville.

21-23. .Pennsylvania Gas Association Annual Meeting—Pocono Manor Inn, Pocono Manor, Pa.

June

4- 6. .Second Annual Appalachian Underground Corrosion Short Course —West Virginia University, Morgantown.

23-27. .Canadian Gas Association—Jasper Park Lodge, Jasper, Alberta, Canada.

24-25. .Michigan Gas Association — Grand Hotel, Mackinac Island, Mich.

September

.3-.5. .Pacific Coast Gas Association Annual Convention—San Francisco.

6. .New Jersey Gas Association Annual Meeting—Spring Lake, N. J.

9-13. .AGA Industrial Gas School—Hotel William Penn, Pittsburgh.

11-13. .Mid West Gas Association Gas School and Conference—Iowa State College, Ames.

13-14. .Maryland Utilities Association 33rd Annual Fall Conference—Cavalier Hotel, Virginia Beach, Va.

16-18. .AGA 9th Annual Accident Prevention Conference — St. Louis, Mo.

October

7- 9. .AGA Annual Convention—Kiel Auditorium, St. Louis, Mo.

SPEED GAS WORK

with Bucyrus-Erie Hydrohoe and 5 Interchangeable Tools

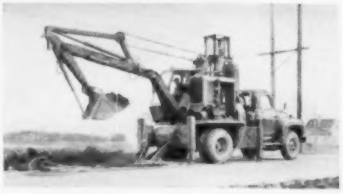
WRIST-ACTION DIPPERS *are quickly interchangeable. Standard 18-in., shown above, narrow 12-in., or wide 24-in. cut the size trench you need . . . save time and expense by reducing amount of backfilling needed. Side cutters are available for these dippers for cutting trenches of additional width.*

The all-hydraulic Bucyrus-Erie Hydrohoe combines the speed and maneuverability of a conventional truck, the precision of hydraulic power and control, and the added versatility of five special tools to give you *the machine* best suited to gas work.

When you see it in action, you'll be convinced that the Hydrohoe is the one machine designed to meet a great variety of gas jobs. Contact your nearby Bucyrus-Erie distributor now. He will be glad to demonstrate.

168H56

SPECIAL UTILITIES DIPPER, *at right, is 20 inches wide, is designed especially for digging deep, short length holes. Rotating through an arc of 95 degrees, this dipper permits undercutting sides, squaring corners . . . reduces hand trimming on manhole, valve or repair excavations . . . reduces amount of backfill required and amount of concrete or black top resurfacing.*



COMBINED POWER UNIT AND AIR COMPRESSOR, *at right, mounted on the Hydrohoe gives you plenty of power for a variety of air tools without the usual transporting problems. This optional combined unit delivers 120 cfm against 100 psi.*

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SOUTH MILWAUKEE, WISCONSIN

SAVES $ LOTS OF $

$ . . . on pipe runs under streets, highways, pavement, gardens, etc.

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HYDRAUGER*

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OPEN HOLE

AVOID TIME WASTE

Hydrauger is a modern, time-saving way to install underground pipe . . . avoids trenching, backfilling, pavement cutting, etc.

2" to 24" BITS and REAMERS

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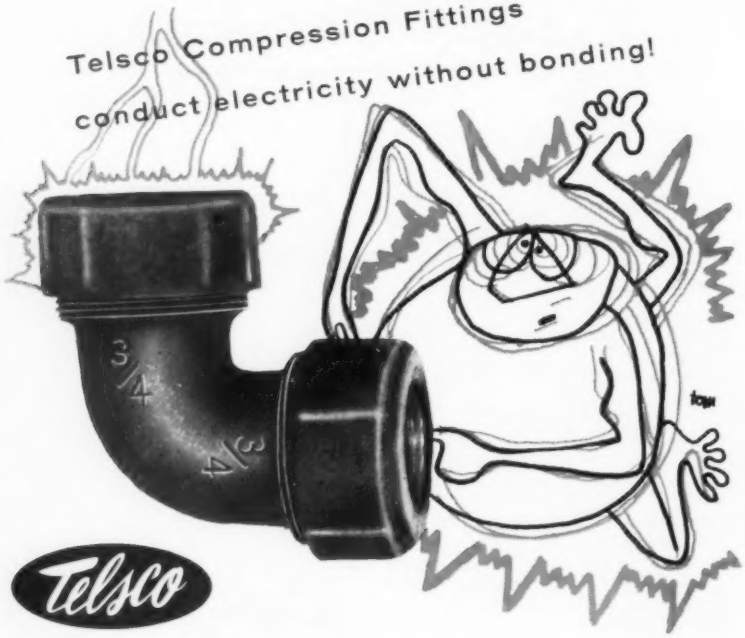
Telsco Compression Fittings conduct electricity without bonding!



Telsco

TELSCO FITTINGS DIVISION

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G-1

news • *Continued*

from page 79

Youngstown combines two divisions into one company

Two divisions of Youngstown (Ohio) Sheet & Tube Co. have been consolidated into one division. Hereafter Continental Supply Co. and Emsco Manufacturing Co. will be known as Continental-Emsco Co.

Fred M. Mayer, president of Continental and recently elected a vice president of Youngstown, will be president of the new division, which will headquarter in Texas.

Magazine marks 40th year of lubricated plug valve

The 40th anniversary of the invention of the lubricated plug valve has been commemorated in a colorful 20-page edition of *The Flow Line*, a Rockwell Manufacturing Co. publication.

The magazine describes how Sven Nordstrom, a young Swedish engineer, invented the lubricated plug valve after his battle with a frozen plug cock ended with a bent wrench and the plug still immovably stuck. Also described are some of the experiences of the old-time Nordstrom valve salesmen as they attempted to introduce the new invention to the sometimes skeptical industrial engineers of the time.

Bureau of Mines releases figures on '55 gas market

The U. S. Bureau of Mines has released figures showing that the marketed production of natural gas in the U. S. totaled 9405 billion cu ft in 1955, for an 8 per cent increase over 1954.

Quantities used by various classes of consumers in 1955 were as follows: residential, 2124 billion cu ft; commercial, 629 billion; field use, 1508 billion; petroleum refineries, 625 billion; and other industrial, 3939 billion.

Average value of natural gas at point of consumption in 1955 was 40 cents per Mcf.

Gross addition of natural gas to underground storage was 505 billion cu ft. Withdrawals from underground storage were 437 billion cu ft.

Interstate shipments and exports of natural gas increased 10

percent in 1955 compared to the previous year, and constituted 54 per cent of the marketed production.

Four-to-one stock split proposed by Peoples Gas

The board of directors of Peoples Gas Light & Coke Co., Chicago, has authorized a program for submitting to stockholders a proposal to split the company's capital stock on the basis of 4 to 1. It is proposed that the par value of the stock would be changed from $100 to $25 per share.

James F. Oates, Jr., chairman and chief executive officer of the company, said the matter will be submitted to the stockholders at the annual meeting on April 4.

He said that after reviewing the opinion of counsel and recommendations of company officers, the board concluded such action would be in the best interests of the company and its stockholders.

Mr. Oates added that it is the intention of the company to continue the payment of dividends at the current $8 per share annual rate. This would mean that the quarterly rate after the 4-to-1 split would be 50 cents a share.

Long Island Lighting installs 300,000th meter

Long Island Lighting Co., Mineola, N. Y., installed the 300,000th gas meter on its system late in 1956. It marked the occasion with

The meter in the background is gold-plated in commemoration of the 300,000th gas meter installed by Long Island Lighting. Admiring the new gas dryer are (from left) Crosby Brezee, manager of Long Island's gas sales; Nathan Handelman, real estate developer; Mrs. Aaron Glubo, the homeowner; and Samuel W. Horsfield, assistant vice president in charge of gas operations.

Get all these advantages with Parsons 150 Trenchliner

- 30 digging feeds from 12 inches up to 25 lineal feet per minute
- 6 trench widths from 16 to 26 inches; depths to 5¾ feet
- multiple depth selections with hydraulic digging-wheel control
- quick-change buckets, solid-type or tine-back, with gumbo lips or "Tap-In" teeth
- retractable bucket-cleaner sabre-type, with optional solid cutter
- controlled discharge, with reversible, shiftable belt conveyor
- standard tractor crawlers, with 16-inch treads, lug-type shoes; street pads optional
- 12-inch crawlers with flat shoes also available for city work
- choice of standard-make, 60 h.p. gas or diesel engine
- All main gears enclosed in constant oil bath; all main shafts mounted on antifriction bearings

When your work schedules call for transmission lines between cities, or additional gas distribution and service lines in town, it will pay you to see what this Parsons 150 wheel-type Trenchliner can do for you. It meets a wide range of trench requirements — combines high-speed operation with exceptional grading accuracy.

Specified grades are easy to maintain. A hydraulic ram on vertical mast raises and lowers the digging wheel — gives fractional-inch depth adjustment, maintains close grade tolerance in toughest digging. Simple mast design eliminates unnecessary superstructure — gives low overhead clearance for work and travel. A separate hydraulic ram tilts the mast, balances weight of the wheel forward for traveling or trailer-loading.

Check the other 150 Trenchliner advantages listed here — then see Parsons distributor or write us. Larger wheel and ladder-type Trenchliners, and rubber tired Trenchmobile® also available.

Want more facts? mail to: PARSONS Company, NEWTON, IOWA

Send us bulletin on 150 wheel-type Trenchliner.

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COMPANY_____ DIV_____

STREET_____

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P555 GAS

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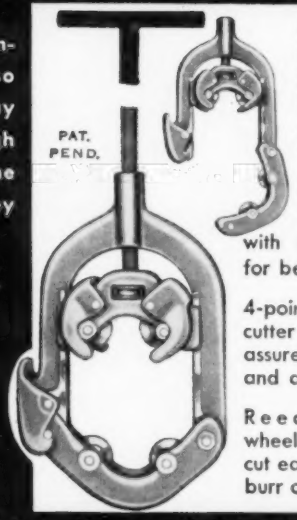
(Koehring Subsidiary)

IF YOU CUT LARGE DIAMETER PIPE...
YOU NEED THESE
New REED HINGED 4-WHEEL PIPE CUTTERS
Four sizes cover the range from 2½" to 12"

Users tell us these completely new cutters are so efficient they often "pay for themselves" through the savings in crew time on a half-dozen cuts. They are the first really practical tools for cutting off steel or cast iron pipe in sizes from 2½" to 12". You can, for example, cut 8" steel pipe completely off in less than five minutes.



Four wheel design requires minimum swing of handle—less digging in ditch work, easier "tight-corner" cuts.

Closed frame permits light weight with complete rigidity for better cutting.

4-point guide aligns the cutter on the pipe . . . assures perfect tracking and a right angle cut.

Reed Razor Blade wheels track perfectly, cut easily and roll down burr on steel pipe.

Unconditionally guaranteed to be the most efficient cutter you have ever used. Ask your jobber or write for literature.

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Proved by USE!

Works in seconds! Loosens Rusted Bolts
nuts, screws, "frozen" parts
. . . . without breakage!

LIQUID WRENCH

A powerful blend of quick-acting solvents that frees "frozen" parts without breakage. Safe for all metals and alloys.

Makes joints LEAKPROOF!

7 BASIC BLENDS

TiteSeal
GASKET & JOINT SEALING COMPOUND

Makes all assemblies leakproof and pressure-tight. Easy to apply with brush-in-handle.

- NON-SOLVENT—WILL NOT HARDEN
- WILL NOT SHRINK, CRACK OR CRUMBLE
- HEATPROOF AND VIBRATION-PROOF

Get them from your Automotive, Hardware or Plumbing Wholesaler!
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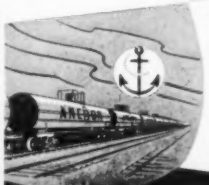
ANCHOR'S BUTANE & PROPANE STAND-BY PLANT PACKAGE

ENGINEERING, INSTALLATION
Anchor's Engineering Dept. will design and supervise plant construction.

FINANCING
Anchor's experienced staff will assist with the financial details..



SUPPLIES
Huge tank car fleet, many plants and vast underground storage assure adequate supplies.

ANCHOR
PETROLEUM COMPANY
TULSA — CHerry 2-7261

a gold-plated meter and a gift of an automatic gas laundry dryer to the lucky homeowner.

The gold-plated meter was installed in a home of the 70-unit Clovermere development in North Bellmore. Nathan Handelman, the developer, specified gas heating equipment, water heaters, and ranges in his houses.

Webster's new plant nearing completion

Scheduled for completion early this year is the new Tulsa plant of Webster Engineering Co., a division of Surface Combustion Corp.

The Webster plant, which will occupy 43,000 sq ft, is part of Surface Combustion's overall building expansion program in Toledo, Columbus, and Tulsa.

The new plant will enable the company to manufacture gas burner equipment which previously had been made to specification elsewhere.

American Natural plans common stock offering

American Natural Gas Co. and its subsidiary, Michigan Consolidated Gas Co. of Detroit, have filed common stock financing proposals with the Securities & Exchange Commission.

American Natural proposes to issue to holders of its 4,421,132 outstanding shares of $25 par common stock, rights to purchase an additional 442,114 shares (on a one-for-ten basis). The subscription price will be determined prior to the time the offering is released and will be lower than the price then prevailing for the outstanding common stock on the New York Stock Exchange. American will use the net proceeds of this stock sale to purchase 1,786,000 additional shares of the common stock of Mich Con, thereby aiding in financing the expansion program of American Natural's system.

Michigan Consolidated proposes to issue and sell the 1,786,000 additional shares of its common stock to its parent for $25,004,000 in cash. It further proposes to pay to American a special cash dividend of $4,998,000 out of its retained earnings, and to issue

and sell to American Natural an additional 357,000 common shares for $4,998,000 in cash.

The financing will provide Mich Con with funds to repay or reduce short-term loans incurred for construction purposes and to pay construction costs. Mich Con states that during the spring and early summer it proposes to issue and sell from $25 to $30 million of bonds, the proceeds to be used for construction purposes and to repay any short-term loans then outstanding.

Record $8.8 million expansion set by Atlanta

A record $8.8 million will be spent in 1957 by Atlanta (Ga.) Gas Light Co. for expansion of service throughout the 50 communities it serves.

The company-wide forecast for increase in customers is 23,000, with growth anticipated in every community. This would be about a 7 per cent growth and would bring total customers to nearly 330,000.

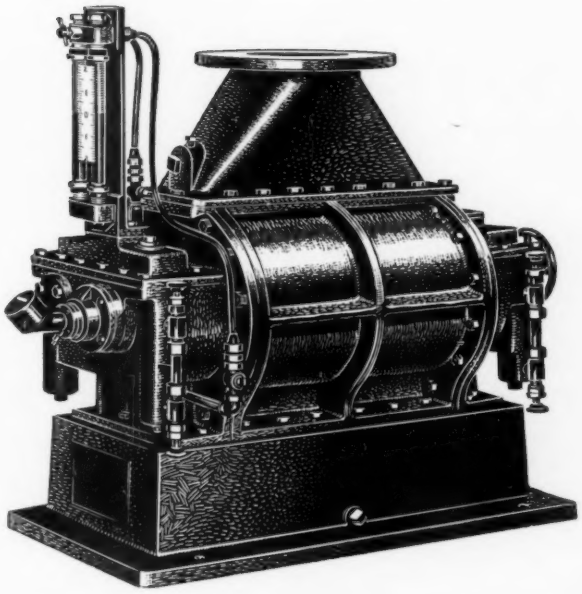
It is contemplated that gas service will be extended to six incorporated communities before next heating season. These towns are Palmetto, Stockbridge, and Fayetteville in the Atlanta area; Acworth and Kennesaw in Cobb county; and Winterville in Clarke county. Work is scheduled to begin in the spring.

The most important single piece of construction to be completed during the year will be the $2 million propane-air plant near Atlanta. It will have a storage capacity of nearly 1-1/3 million gal. A small propane plant at Rome and enlargements or improvements in existing propane facilities are also planned.

Gas regulator conference attracts 42 gasmen

Forty-two representatives of gas utilities and pipelines attended the three-day fall gas regulator conference held by Fisher Governor Co. at its headquarters in Marshalltown, Iowa. The gas company representatives were accompanied by 13 Fisher field office people.

The three days were spent in factory tours, demonstrations of manufacturing procedures and equipment maintenance, and class periods conducted by Fisher En-



R-C rotary positive displacement meters retain "cash register" accuracy

For utility metering or proportioning of process gas, Roots-Connersville rotary gas meters assure permanent accuracy unmatched by any other design.

- 15:1 accurate operating range.
- Accuracy is not affected by variations in specific gravity, rate of flow, pulsations or impurities.
- Precision machined measuring chambers insure maintenance-free accuracy.
- No valves, diaphragms or other small parts are used, eliminating leakage due to wear.

R-C meters will meet your most exacting requirements in capacities from 2,000 to 1,000,000 cfh. Write for Bulletin M-152 for complete specification details.

Engineers—unusual career opportunities await you at Roots-Connersville. Address your resume to Professional Employment Manager.

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257 Oregon Ave., Connersville, Indiana. In Canada — 629 Adelaide St., W., Toronto, Ont.

gineering and sales personnel.

Companies represented were Manufacturers Light & Heat, Iowa Power & Light, Corning Natural, Long Island Lighting, Public Service Electric & Gas, Niagara Mohawk Power, Connecticut Power, Tennessee Gas Transmission, Rio Grande Valley Gas, Transcontinental Gas, Lone Star Gas, Houston Natural, and United Gas.

Others were Mountain Fuel Supply, Southeastern Michigan Gas, Michigan Gas & Electric, Michigan Consolidated, Louisville Gas & Electric, Oklahoma Natural, Pioneer Natural, Southern California Gas, Blackstone Valley Gas & Electric, Laclede Gas, Missouri Utilities, Union Electric, Central Illinois Light, and Illinois Power.

Time out from tours, demonstrations and classes was taken by this group attending Fisher's gas regulator conference to pose for the photographer.

High court rules against Coleman in patent case

Holly Manufacturing Co. has announced that the Coleman Co. has lost any chance of further appeal from the federal court judgment holding Coleman to be an intentional and deliberate infringer of Holly's Narro-Wall wall heater patent.

According to Holly President J. S. Johnson, the Supreme Court refused to review the judgment of the court of appeals for the 9th circuit. The action of the Supreme Court confirms the previous 9th circuit court ruling that Coleman infringed the Holly NarroWall patent.

The court of appeals' opinion that the high court refused to review points out "that the Holly patent . . . is valid and that all of Coleman's wall heater models Nos. 64, 67, 68, and 69 infringe" and "that such infringment is and has been intentional, conscious and deliberate . . . "

According to word from Coleman's sales vice president C. L. Burrows, all Coleman wall heater models affected by the decision were discontinued July 15, 1956, and were replaced by models which are now on the market.

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the Concentrated fuel
WARREN
PETROLEUM CORPORATION
LIQUEFIED PETROLEUM GAS DIVISION
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Outsells . . . Outlasts . . . Outperforms . . . ALL OTHERS!
NEW AQUA Water or gas
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Your Name In Gold FREE!
VALVE BOX LOCATOR
One on EVERY SERVICE CAR!
• NATION'S MOST WIDELY USED LOCATOR!
• NO WIRES, BATTERIES or SWITCHES simple, powerful magnetic action, factory adjusted for YOUR geographical location.
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• RUGGED, COMPACT, ACCURATE, CONVENIENT!
• GUARANTEED—to function regardless of surface or ground cover.
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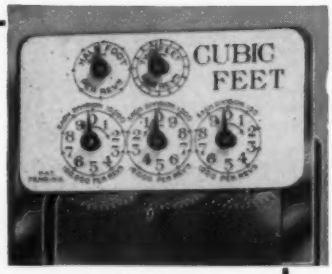

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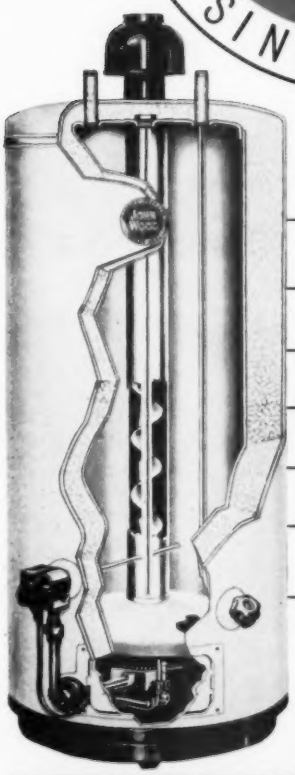

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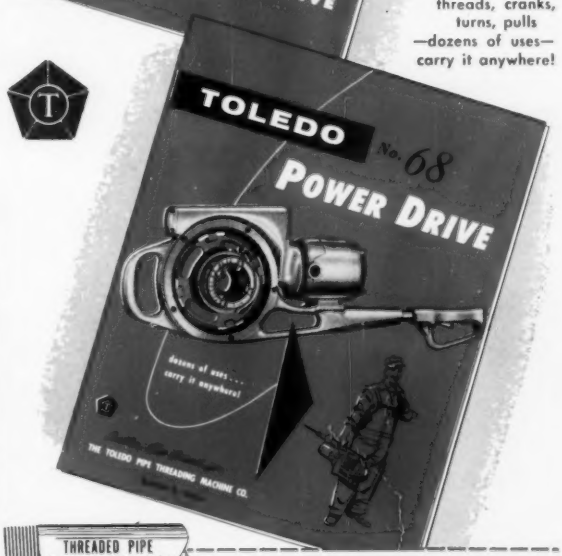

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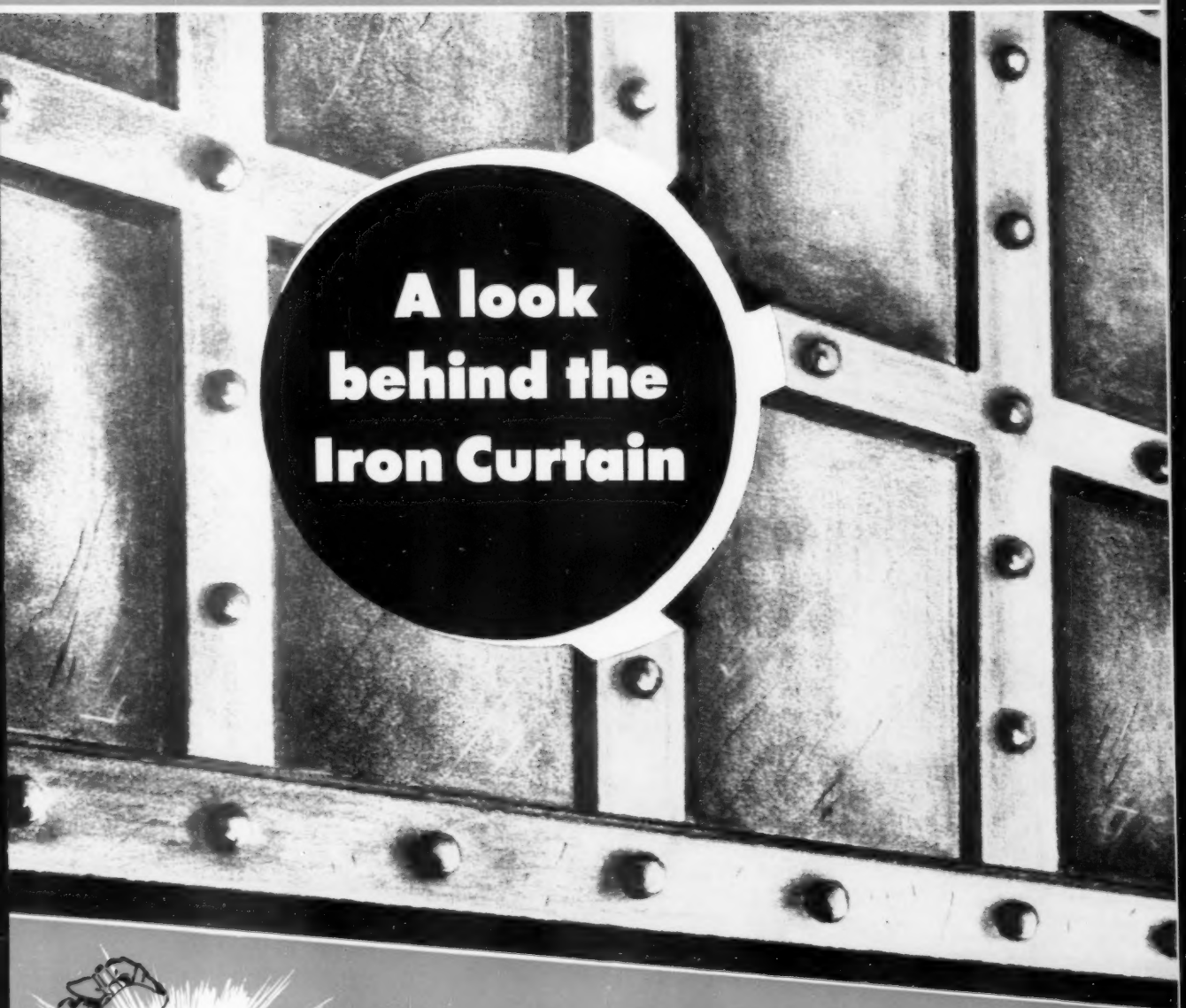

A look behind the Iron Curtain

Soviets use new process for inspecting butt-welded pipe

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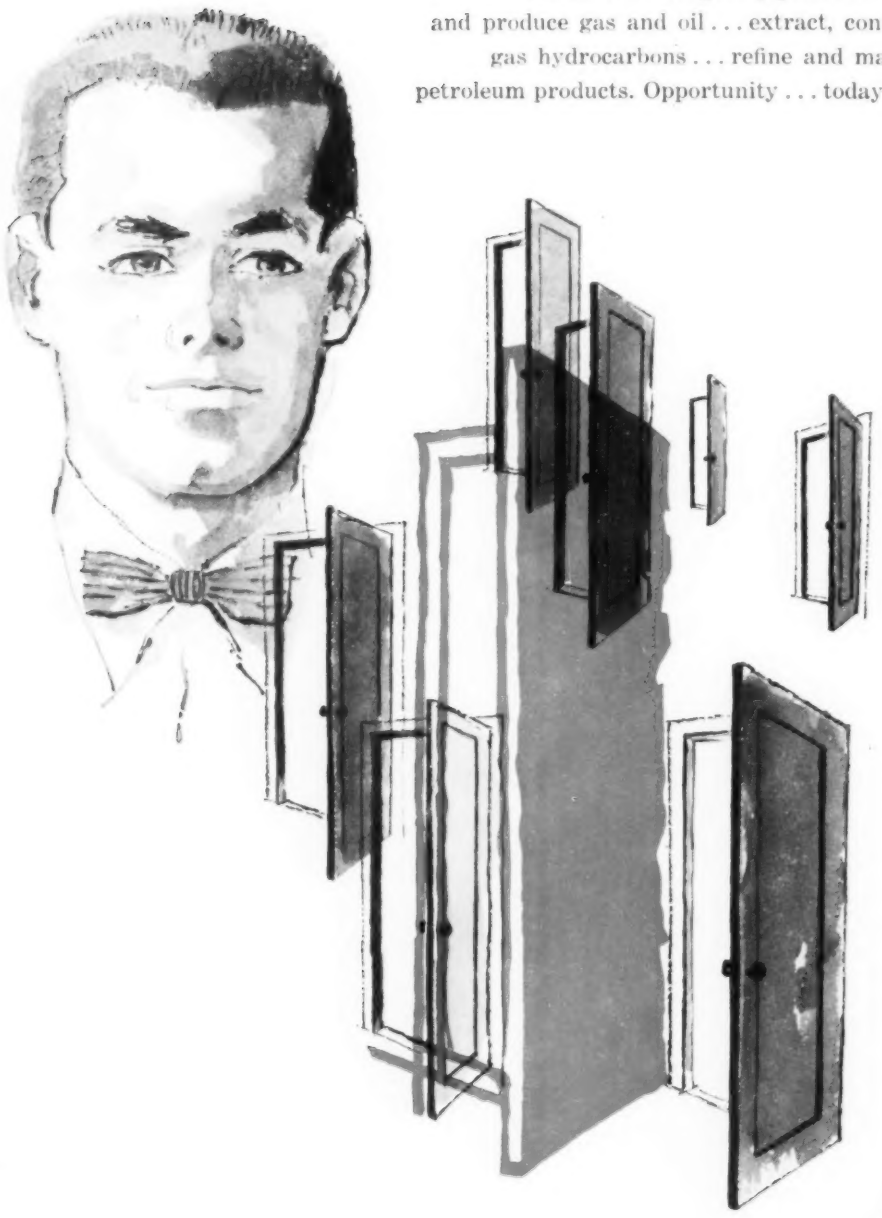

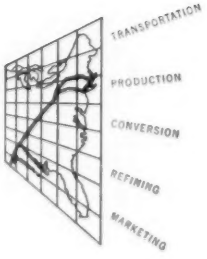

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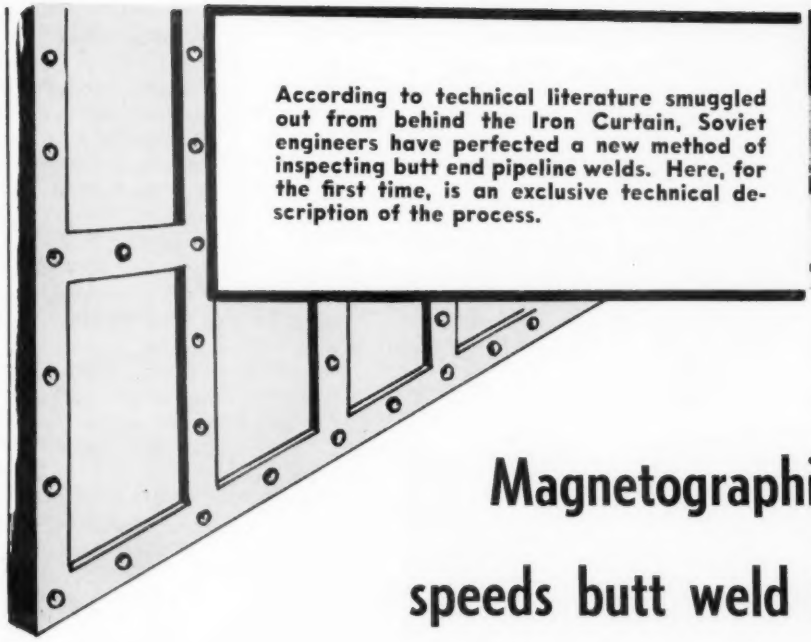
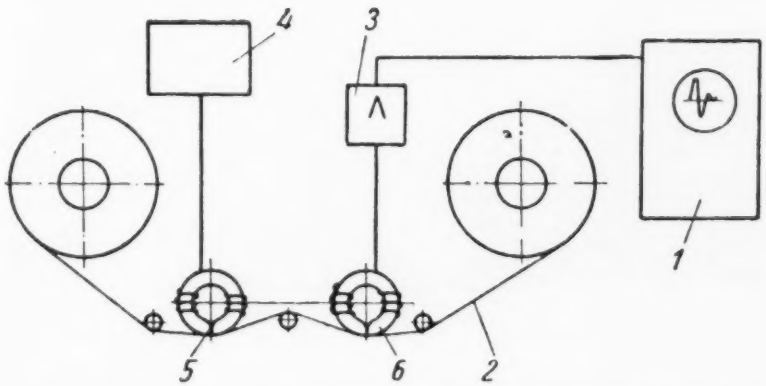


According to technical literature smuggled out from behind the Iron Curtain, Soviet engineers have perfected a new method of inspecting butt end pipeline welds. Here, for the first time, is an exclusive technical description of the process.

Magnetographic method speeds butt weld inspection

By JAMES JOSEPH



Schematic shows reproduction of flaw records: (1) oscillograph, (2) tape, (3) amplifier, (4) erase generator, (5) erase head, (6) reproducing head.

PERHAPS of far-reaching importance to the gas industry is the Soviet's just-announced method for the continuous inspection of butt welds in gas conduits—the "magnetographic" method which records weld flaws on 35-mm tape and analyzes them from pulse patterns on an oscillograph.

The procedure is based on the finding that if a pipe or sheet of steel is magnetized, residual magnetism will differ in areas of weld defects. It is this difference in residual magnetism, which, picked up by the tape and then amplified, is used to deflect the "spot" on an oscillograph's screen. The flaw's magnitude and type (whether a crack, lack of fusion, etc.) can be detected and categorized by the shape and amplitude of the pulse appearing on the oscillograph.

Claim Soviet scientists: "the magnetographic method reveals all possible flaws such as cracks, lack of fusion, porosity and inclusions. Longitudinal cracks of any dimension are clearly revealed, right down to hair cracks . . . these latter often not revealed by X-ray."

Beginning in 1955, the Soviets made magnetographic control "compulsory procedure" for inspection of welded storage tanks. Previously, the method had proved successful for inspecting natural gas conduits, petroleum storage tanks, high-pressure steel boilers, railroad bridges and other highly stressed welded structures.

The development—and its announcement—needs to be put in perspective. For it is one of many Soviet developments handed Western researchers by scholarly metallurgist Henry Brutcher. Brutcher, master of a dozen languages, is probably the Free World's most gifted technical translator; his speciality is metallurgy. For more

than two decades, an ever-increasing volume of Iron Curtain technical literature has flowed to his office in Altadena, Calif. Some of it is smuggled through clandestine channels. Brutcher supplies transcripts to Free World governments and industry, and in the process, takes the pulse of the Soviet metallurgical process, the heartbeat of its industrial expansion.

Says Brutcher today, "Soviet science is opening up. A decade ago, we could discount their claims, look skeptically under what few production figures they published.

Metallurgist-translator Henry Brutcher studies his supply of Soviet technical journals. Many of these publications were smuggled out of Iron Curtain countries.

Typically, they might publish a new way to work steel . . . but purposely fail to include specifications of the steel in question. This made the 'discovery' all but worthless to Western scientists. The Geneva Conference seems to have wrought a change, though in view of Middle East conflicts and revolt in the satellites, the metallurgical curtain may be clanging shut once more. But since Geneva there's been a policy change. Soviet research publications are now rushing into print the newest of technological advances. What's coming through now backs up what we've suspected all along: that Soviet metallurgical progress is in some respects remarkable . . . and where not that, highly advanced."

Reporting in a 1955 issue of *Svarochnoe Proizvodstov* (Factory Laboratory), four Soviet metallurgists discuss recent Soviet efforts to improve weld inspection methods in highly stressed structures, including petroleum storage tanks and gas conduits. They outline such in-use methods as cutting out and testing a section of the weld (from one-two per cent of the total number of butt welds) . . . and X-ray/gamma ray inspection (pointing out that both are slow). As for existing methods of magnetic inspection, the metallurgists conclude that they are satisfactory "only for defects close to the surface, and do not enable welds in more than one plane to be inspected."

With this critique, they introduce a "new method of continuous inspection of butt welds" (developed during 1953-4 by S. Makhover and Yu. Usenko) which they call "magnetographic."

Magnetographic inspection records the leakage flux on magnetic tape. After recording, "each element of the tape which has been in contact with the weld, has a different residual magnetization, and this is greatest at those portions of the tape corresponding to the greatest defects."

The magnetographic method of flaw detection involves two operations: (1) recording the flaws on tape; (2) reproduction, amplification and analysis (via cathode ray tube and oscillograph).

The set-up includes (1) an oscillograph (cathode ray tube of 3-in. diameter); (2) tape—35 mm, similar to that used in recording sound; (3) amplifier (four-stage, using tubes 6Zh8, 6N98 and 6P6S); (4) erase generator (based on a power tube of the G-807 type); (5) erase head; (6) reproducing head.

Involved are two types of heads: (1) a disc-shaped electro-magnet for inspection of sheet metal and plate structures. The magnet is moved at rate of 16½-19½ ft/min. when inspecting sheet metal structures. It is held stationary (and fixed to the pipe) when inspecting butt welds at pipe junctures; (2) a cam-actuated, but otherwise stationary head, in which the tape is simultaneously moved both longitudinally and transversely past an air gap in the magnetic head. This unit seems most advantageous for small-diameter pipe and plate.

The disc-scanner is a kind of roller. It consists of an axlelike steel core which supports two steel discs and a third, this of insulating material with a rubber rim, which rides between the two. Separating the three are two windings. The center disc's prime function is to press the tape (which is carried on a rubber belt) to the weld-surface under inspection. The electromagnets consist of 750 turns, each winding's total resistance about 6 ohms. Diameter of all three discs is 8 21/32 in. Distance between discs is 5 29/32 in. The magnetic head weighs some 50 lb.

When inspecting butt welds between pipes (at their junctures), the magnet is fixed to the pipe and kept stationary, while the tape on its rubber belt is moved past the head.

The pipe is first magnetized. This, by winding 6-7 turns of wire (50-70 sq mm cross-section) around the pipe on each side of the weld. A portable welding machine feeds current to these turns.

The magnetic field superimposed on the tape produces, in the windings of the recorder head, an emf of about 1 millivolt. This voltage is amplified, and used to deflect a spot on an oscillograph.

The shape of pulses on the screen varies with the shape of the weld flaw. *Longitudinal cracks* produce obtuse-angled pulses . . . a single longitudinal crack producing a succession of pulses, depending on the flaw's length. *Transverse cracks* (accurately coinciding in direction with the direction of the magnetic field), produce only a single pulse. Portions of the weld which *lack fusion* (usually somewhat wider than a simple crack), show up as a rather flatter pulse, its height increasing with depth of the no-fusion zone. *Blowholes* or *inclusions* are revealed by characteristically hump-backed pulses.

It might be noted that the analyzing electronic gear is rigged with a neon bulb which lights when a detected flaw exceeds a "critical" depth (greater than 10 per cent of the thickness of the plate being inspected).

In one Soviet-reported test, the magnetographic method was applied to butt welds in a natural gas pipe 20.85-in. diameter, under "service conditions." Simultaneous with magnetographic inspection, the same pipe and its some 50 butt-welds were inspected by gamma ray. The entire perimeter of each weld was magnetized by a few windings of wire, as mentioned before. "Results," say the researchers, "were practically identical. But in six welds the magnetographic method showed up non-metallic inclusions, which lowered the estimate of weld quality by one point compared with gamma ray assessment. A hairline crack was found in one weld which escaped detection by gamma inspection."

Through a series of refinements and experiments, the Soviets have developed another type of reproducing head, most advantageous for flaw-inspecting welded sheet steel. Here, while the head is held stationary, the 35-mm tape is simultaneously run at constant speed both transversely and longitudinally across the head's air gap (which approximates 20 u).

Says the report: the tape-feed mechanism simultaneously "imparts a transverse and longitudinal motion to the tape" past the air gap in the fixed magnetic reproducing head. Feed mechanism consists of a special rotating cam which forces the tape carrier-arm to vibrate at 15¾ in. per second, while a roller moves the tape past the magnetic head at 1 27/64 in. per second. In this way, the weld is "scanned."

Both these scanning devices (disc and cam-actuated heads) are apparently in extensive use throughout Soviet industry.

Once recorded, tapes are erased, and reused.

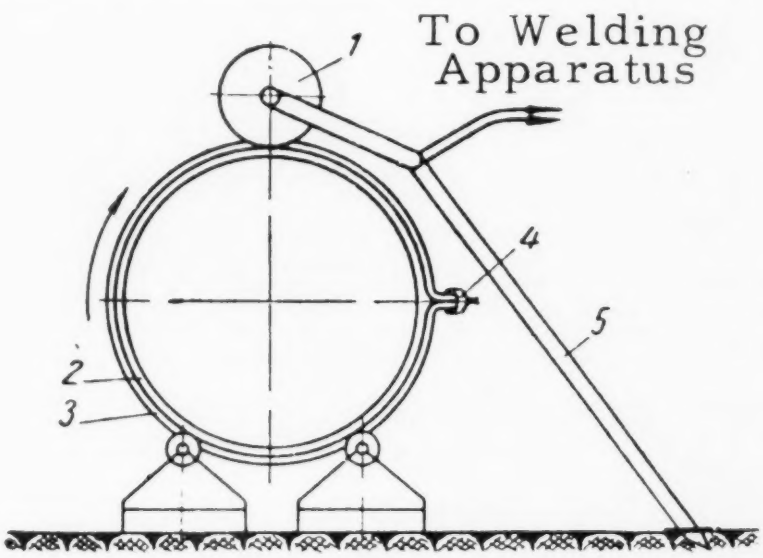
Earlier (1954), the magnetographic method utilized a narrow, 6.5-mm tape. The narrow tape was discarded for a number of reasons. First, since the tape was wound around a rubber belt, and placed across the weld, it was difficult to locate the site of a flaw once it was detected. Also, by this procedure only about 40 per cent of the tape was actually put to use. Even so, narrow-tape magnetography was, during 1954, introduced into four Soviet plants making storage tanks. In total, about 10,000 ft of weld were inspected (the plate varying in thickness between 15/64 and 25/64 in.). Simultaneous with magnetography, the welds were scanned by gamma rays.

In a number of cases gamma inspection failed to reveal defects (particularly internal cracks) easily picked up by the tape.

Soviet metallurgists sum it up this way:

Magnetographic method of flaw detection clearly detects longitudinal cracks, lack of fusion, slag inclusions and pores in welds.

It is a highly sensitive method, and capable of high-speed inspection (at rate of 16½-19½ ft per minute).



Schematic drawing shows the inspection of welds between sections of pipe. Shown are (1) electromagnet, (2) tube, (3) tape on rubber belt, (4) clamp, and (5) support.

It is both simple and inexpensive, with the added advantage that it permits inspection in more than one plane and while structures are in service.

The method is already "compulsory" in many Soviet factories, particularly those working highly stressed structures. It has proved practicable for inspecting natural gas pipes to 20-plus inches diameter—and under "service conditions."

Still necessary to research: (a) quantitative determination of the size of different flaws; (b) perfection of new types of detection equipment; (c) applications for other, diverse parts and structures. ■

Maintenance welding on high-test line pipe

Test and testing equipment used in Test I. Liquid is leaking from crack in fusion zone of weld and patch.

By A. M. HILL and F. W. ZILM
Service Pipe Line Co., Tulsa

Since 1948, when the API adopted the specification, 5LX Grade X46 and X52 line pipe have come into wide use throughout the pipeline industry.

Chemical and physical properties of the high-test line pipe have presented a rather difficult problem in maintenance welding. Established practices for maintenance welding on Grade B pipe were unsatisfactory when applied to the high-test pipe owing to frequent underbead cracking.

Through a series of tests, the procedure described by Mr. Hill, who is superintendent of line maintenance, and Mr. Zilm, welding technician, has been adopted by their company, Service Pipe Line Co.

DURING the early part of 1955 a testing program was carried out at our company's Tulsa shops to find a solution to the problem of underbead cracking of arc welds where branch connections and reinforcing sleeves are attached to the pipeline by welding. In these tests the welding was performed under conditions simulating, as nearly as possible, those encountered in the field.

The tests consisted of making spot welds and welding various size patches and full encirclement sleeves on chambers fabricated from 24-in. OD pipe manufactured in accordance with API Specifications 5L and 5LX. All welding was done on test chambers cooled with a mixture of water, anti-freeze, ice, and salt. The brine was circulated by a pump during the welding operation. After welding was completed on the various chambers, the welds were inspected for underbead cracks either with magnetic particles, or by sectioning 100 per cent of the weld into coupons which were broken in the weld zone to expose the root bead. Several chambers were subjected to destructive tests by hydrostatic pressure.

To simulate field conditions, an internal pressure of 500 psi was maintained in the larger chambers during the time the patches and sleeves were welded. The chambers which were tested to destruction with hydrostatic pressure were constructed so that the pressure in the chamber was exerted in the space between the sleeve or patch and the chamber wall. The destruction test on some of the chambers was conducted while the assembly was cooled to approximately 32°F.

Materials used in tests are described in *Table 1*.

The results of the tests show that the high-yield-strength pipe is very sensitive to the quenching effect of the liquid contained in the test chambers. Underbead cracking occurred in all except one test specimen made with E6010 and E7010 electrodes. These are the types of electrodes used for field-welding pipe joints and normal maintenance welding on lines laid with Grade B pipe. There was also a pronounced increase in the hardness of the pipe material in the heat-affected zone.

Tests 1, 2, 3, and *4* revealed that underbead cracking occurred in the fusion zone between the weld beads and the base metal on welds made with E6010, E7010, and E9010 electrodes. These types of electrodes are unsatisfactory for use when welding is required on a pipeline (full of liquid under pressure) laid of pipe manufactured in accordance with API Specification 5LX Grades X46 and X52.

Tests 5 and *10* revealed that welds consistently free of underbead cracks can be obtained with E7016 low-hydrogen electrodes, both conventional and iron-powder type.

Tests 6 and *7* revealed that a repair patch or a branch connection saddle-welded onto high-test pipe tends to reduce the ultimate strength of the pipe due to concentrations of stresses in the fusion line of the weld that is parallel to the axis of the pipe.

Tests 8 and *9* revealed that high-test pipe is not suitable for fabricated piping systems such as manifolds, pump headers, etc., unless close control of preheating and interpass temperature is maintained.

Test 11 revealed that E6010 and E7010 electrodes are not satisfactory for welding on pipelines full of liquid which are laid of pipe manufactured in accordance with API Specification 5L Grade B at temperatures as low as 25°F.

Tests 12 and *13* revealed that dye-penetrant material would be a satisfactory method for inspecting welds made on pipelines full of liquid under pressure.

Although satisfactory results were obtained using both the conventional E7016 low-hydrogen electrodes, and the E7016 low hydrogen-iron powder electrodes, it was found that the latter kind had many advantages over the conventional low-hydrogen electrodes. The advantages are:

1. Deposition rate. Using ⅛-in. diameter iron-powder electrodes, the deposition rate per linear inch of weld is equal to that of the size 5/32-in. diameter conventional low-hydrogen electrodes.

2. Less operator fatigue. The iron-powder electrodes can be used in all positions without oscillating. This gives the operator better control of the weld puddle and results in a deposit of weld metal having a smooth surface and contour. The fluidness of the molten metal of the conventional low-hydrogen electrodes requires close observance and controlled manipulation of the electrode by the welder when welding in the overhead and vertical positions. The fluidness of the weld puddle and the necessity of manipulating the electrode results in a weld bead having a very uneven surface. Undercutting of the base material adjacent to the weld bead is also a problem.

3. Ease of cleaning. The beads of weld metal deposited with the iron-powder electrodes have a smooth contour that facilitates slag removal. With conventional low-hydrogen electrodes it was necessary to use hammers and chisels to remove slag from the rough surface of the weld beads, especially where undercutting occurred. Slag remaining on or adjacent to a weld increased the difficulty of handling the molten metal when depositing additional beads.

4. Inspection. The tendency of the slag to adhere tightly to the weld metal deposited with the conventional electrodes can hide porosity and undercutting in or adjacent to the welding bead.

5. Elimination of porosity. Porosity in the weld metal was a problem with the conventional low-hydrogen electrodes, particularly when restarting the arc after changing electrodes. Depositing more weld metal over such areas tends to increase porosity rather than remove it. This trouble did not occur when the iron-powder electrodes were used.

TABLE 1 MATERIALS USED IN TESTS

Carrier Pipe—(test chambers)

API 5LX Grade X52 Pipe 24-in. OD, .312-in. wall thickness

Chemical anaylsis of carrier pipe (per cent)

	Ladle	Check 1	Check 2
Carbon	.270	.300	.290
Manganese	1.210	1.250	1.110
Phosphorus	.020	.018	.018
Sulfur	.030	.035	.036
Carbon equivalent	.573	.613	.568

Physical properties of carrier pipe

Yield strength	60,620 psi
Tensile strength	89,890 psi
Per cent elongation in 2-in.	27.5

*Patches and sleeves

API Grade "B" Pipe 24-in. OD .500-in wall thickness
API Grade "B" Pipe 24-in. OD .312-in. wall thickness
API 5LX Grade X52 Pipe 24-in. OD .500-in. wall thickness
API 5LX Grade X52 Pipe 24-in. OD .312-in. wall thickness
(*) The corners of all patches were cut on a radius.

Welding electrodes

AWS E6010 5/32-in. Diameter
AWS E7010 5/32-in. Diameter
AWS E9010 5/32-in. Diameter
AWS E7016 5/32-in. Diameter (low hydrogen conventional)
AWS E7016 5/32-in. & ⅛-in. diameter (low hydrogen iron powder)

Cooling Medium

Crushed ice, water, alcohol-base anti-freeze, and rock salt.
(It was necessary to add anti-freeze to the brine to keep the circulating system from freezing.)

Test chamber ruptured beneath patch in Test 2. Note liquid escaping near top of section cut from chamber.

In Test 3, patches were tested with hydrostatic pressure applied to the area between patch and test chamber.

Here is how the tests were run:

Test No. 1

Patches made from Grade B 0.312-in. wall pipe were welded on a Grade X52 pipe chamber filled with water at a temperature of approximately 50°F. One patch each was welded with E6010, E7010, E9010, and E7016 electrodes. Upon completion of welding, hydrostatic pressure was applied to the area between the patch and the test chamber. In all cases the failure occurred in the fusion zone between the weld metal and the patch.

Test No. 2

Identical to *Test 1* except that Grade X52 material was used for the patches. In this test, failure occurred at the fusion zone between the weld and the pipe on all patches with the exception of those welded with E7016 electrodes. In this case, the test chambers ruptured underneath the patch.

Test No. 3

In this test a chamber, having various size holes drilled partially through the wall of the pipe, was filled with water and temperature was reduced to 50°F. The drilled holes were spot-welded to simulate the repair of corrosion pits on a pipeline. Several patches were welded to the chamber to simulate conventional repair work, using various types of electrodes. In addition, several weld beads were deposited on the surface of the test chamber. The beads were of both single- and multiple-pass layers. The weld beads were ground flush with the surface of the pipe and examined for cracks by magnetic-particle inspection. The patches were tested with hydrostatic pressure applied to the area between the patch and the test chamber. This inspection revealed underbead cracking of all beads deposited with E6010 and E7010 electrodes. No underbead cracking occurred in the weld metal deposited with E7016 and E9010 electrodes.

Test No. 4

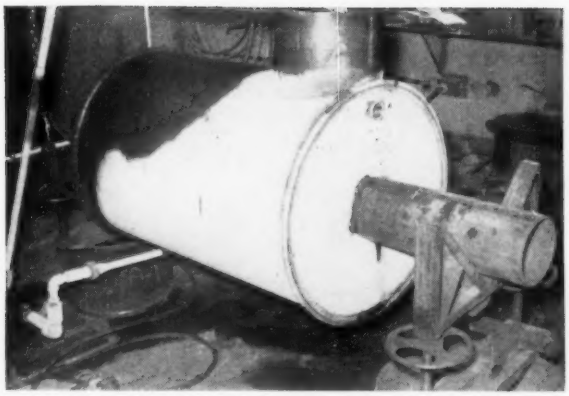
This test chamber was cooled to approximately 30°F. Patches and pit holes similar to those in *Test 3* were welded, using E9010 and E7016 electrodes. Hydrostatic tests, physical, and magnetic-particle inspection of the welds revealed underbead cracking occurred where weld metal was deposited with E9010 electrodes. No underbead cracking occurred where weld metal was deposited with E7016 electrodes.

Test No. 5

Full encirclement sleeves made of Grade B pipe were welded to a test chamber cooled to 32°F. E7016 electrodes were used for all welding in this test. Frost formed on the surface of the test chamber prior to installing sleeve. The entire length of both the circumferential and longitudinal welds were sectioned and examined by making a reverse bend of the sleeve sections in relation to the surface of the test chamber. With the exception of some minor cracks at the area where tack welds were deposited, no other evidence of underbead cracking was found.

Test No. 6

One 24-in. x 12-in. and one 48-in. x 16-in. patch, made from Grade B pipe, were welded to a Grade X52 pipe chamber which was cooled to 32°F and pressured to 500 psi. Upon completion of welding, pressure in the chamber was increased to 1450 psi when failure occurred in the fusion zone between the 48-in. x 16-in. patch and the weld. The hole in the test chamber,



Frost on surface of chamber for Test 5 prior to installing sleeve.

Failure in test chamber adjacent to 16-in. x 48-in. patch (Test 6).

which allowed the pressure to equalize between the chamber and the patch, was plugged by welding, and the chamber was again pressurized. During the second pressure test, failure occurred at 1500 psi in the test chamber adjacent to the weld at the edge of the 48-in. patch. In this failure the pipe ruptured parallel to the long side of the patch. The rupture was approximately 39 in. long, and tore circumferentially around the test chamber for 6 in. at each end.

Test No. 7

The section of pipe which ruptured in *Test 6* was removed and a new section of pipe inserted in its place to maintain the original length of the test chamber. Hydrostatic pressure was again applied. Pressure of 2000 psi was obtained when a failure occurred in the fusion zone between the weld and the edge of the 24-in. x 12-in. patch.

Test No. 8

A full encirclement sleeve made from Grade B pipe, 0.500-in. wall, 24 in. in length, was installed and welded with E7016 electrodes onto a 20-ft Grade X52 pipe chamber cooled to 32°F. A pressure of 500 psi was maintained in the chamber during the welding operation. Upon completion of welding, and while the chamber was still cool, the pressure was increased to determine the maximum amount of pressure which a repair sleeve of this type would withstand. When a pressure of 1500 psi was reached failure occurred in the weld adjoining one of the weld caps to the pipe. The sudden release of water pressure blew the weld cap a distance of approximately 75 ft. Simultaneously, the shock wave of the water and ice contained in the chamber caused failure in the weld adjoining the other weld cap to the opposite end of the pipe.

Procedure used in making these welds was as follows: The root beads were deposited with 5/32-in. diameter E6010 electrodes. The second bead (hot pass) was applied immediately using 5/32-in. diameter E7010 electrodes. The remaining beads were deposited by the submerged-arc process. No preheating was used as the ambient temperature was about 90°F. In determining the cause of these failures, we reconstructed the order in which the welds were made. The second weld that failed was completed first. By close inspection of the cross section of the weld metal it was found that the root and second beads in an 18-in. segment of

Failure that occurred in fusion zone of weld 12- x 24-in. patch in Test 7.

In the background is the weld cap blown from chamber resulting from cracked weld in Test 8.

weld had cracked. The remainder of the weld was of good quality. It is evident that the heat input to the base material, after deposition of the root and second beads, had not dissipated beyond the critical range (for the greater portion of the weld length) before the submerged arc was applied to deposit the third bead. By close examination of the other weld, it was found that the root and the second beads had cracked throughout their entire length. This weld was the last to be completed on the test chamber. It is logical to assume that the heat input of the submerged arc would induce an expanding force sufficient to crack the root and second beads after the base material had cooled to the critical point. This is substantiated by similar welding difficulties which have been encountered in constructing lines laid with X52 pipe. In many instances, after the pipe had cooled to ambient temperatures, the root and second beads have cracked soon after the welder starts the third bead. This trouble is more likely to occur when the welding crew begins welding at the start of the day, with atmospheric temperatures below 50°F.

In Test 9, 2000-psi pressure was applied on test chamber on which full encirclement sleeve was welded.

Test No. 9

The weld metal which remained on the weld caps and pipe in *Test 8* was machined off and new bevels made. The weld caps were then replaced on the pipe and welded by preheating the weld areas to approximately 350°F. The weld caps were then welded to the pipe using E6010 electrodes for the root pass and E7010 electrodes for the remaining passes. These welds were inspected by radiography and no defects were located. The chamber was refilled with liquid and hydrostatic pressure was again applied. When a pressure of 2200 psi was reached a failure occurred in the longitudinal weld of the encirclement sleeve. Higher pressure could have been attained had the assembly been so designed to permit 100 per cent penetration of the weld metal at this point. The lack of penetration was deliberate, in that we did not think it advisable to fuse or penetrate the chamber with a welded seam parallel to the axis of the pipe.

Test No. 10

This test was conducted to determine the handling characteristics, and whether or not we could obtain welds free of underbead cracks using E7016 low hydrogen-iron powder electrodes. (These electrodes were not available when this testing program was started.) Various size patches and full-encirclement sleeves made of Grade X52 0.312-in. wall pipe were welded, using these electrodes, to test chambers made of the same material, which were cooled to 25°F. Physical tests conducted on the entire length of the weld metal deposited revealed that no underbead cracking had occurred.

Test No. 11

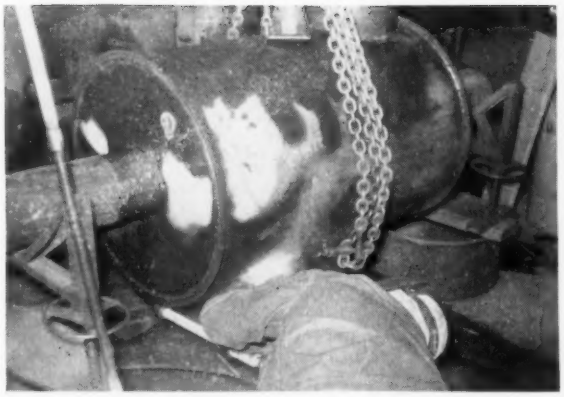
To determine the effects of maintenance welding on pipelines laid of pipe conforming to API 5L Grade B, carrying liquid at temperatures below freezing, various size patches cut from this grade material were welded to chambers of the same material. These chambers were cooled to a temperature of 25°F and this temperature was maintained during welding. Both E6010 and E7010 electrodes were used. These welds were examined for underbead cracking by sectioning the entire length of the weld and making reverse bends in the weld area of each section. Underbead cracking was found at two locations under the weld on a 16-in. x 33-in. patch. One crack was about 1¾ in. in length, and the other was ⅜ in. in length.

Test No. 12

This test was conducted to determine the most practical non-destructive method of inspecting welds (for underbead cracking) made on pipelines full of liquid under pressure. Patches cut from Grade X52 pipe were welded to a Grade X52 pipe chamber cooled to 25°F. Welding was done with E6010 and E7010 electrodes. Experience gained in our first tests revealed that cracking definitely would occur under these conditions. On some of these patches, cracking occurred in the fusion zone between the weld metal and the patch before the welds were completed. These cracks were visible to the naked eye. On completed welds where cracks were not visible to the naked eye, dye-penetrant material was used as an inspection medium. This inspection exposed several cracks in the fusion zone between the weld metal and the patch, also between the weld metal and the chamber.

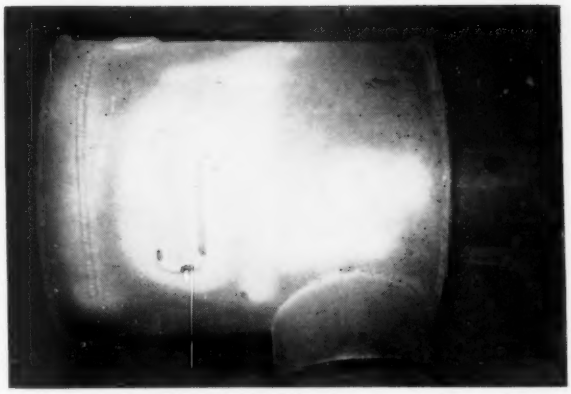
Test No. 13

To determine whether dye-penetrant materials if used for weld inspection would consistently expose underbead cracks, two 16-in. x 33-in. patches cut from Grade B pipe were welded to a Grade X52 pipe chamber cooled to 25°F. Size ⅛-in. low-hydrogen iron powder electrodes were used for welding in this test. The welds were inspected by dye-penetrant material. This inspection revealed that no cracking had occurred. The entire length of the weld was then sectioned and examined by making reverse bends of the sections. No cracks were found in the test.



Installing and welding sleeve with iron powder electrodes on test chamber (Test 10) cooled to 25°F (above).

In Test 12, underbead crack between weld and patch occurred before weld was completed (right above).



Underbead cracks located with dye penetrant material in Test 12 (right).

Summary and recommendations

These tests were made to establish a welding procedure that would be dependable for making repairs to corroded pipe, installing new connections, and performing general maintenance work on pipelines laid of high-test line pipe.

The tests revealed that welding materials and procedures currently used by our company are not satisfactory for the repair and maintenance of pipelines laid with pipe manufactured in accordance with API Specifications 5L and 5LX in Grades B, X42, X46 and X52, where the surface temperature of the pipe is below 50°F.

Hydrostatic tests conducted on chambers proved that fittings constructed to completely encircle the pipe will consistently withstand higher internal pressures than the reinforced saddle-type fittings.

By comparing the results of the various tests, we established a new welding procedure. Also selected materials and equipment that we consider satisfactory for making repairs and installing connections on any pipe of the grades currently in use throughout our company's system.

It is common practice throughout the pipeline industry to repair corrosion pits on common grades of 5L pipe by filling the pits with weld metal fused to the surface of the pipe, or by welding patches over the pits. However, this method should be restricted to the low- and medium-carbon grades of pipe.

As a result of our findings, we have recommended that our company adopt the following procedure for repair and maintenance welding on pipelines:

1 *API 5LX Pipe, Grades X46 and X52*

(a) Use fittings that completely encircle the pipe. This holds true regardless of pipe size, when welding is required for making repairs, or for installing new connections onto a line.

(b) Use E7016 low hydrogen-iron powder electrodes for all welds that are fused to the wall of the pipe.

2 *API 5L Grade B and 5LX Grade X42*

(a) Use fittings that completely encircle the pipe when welding is required for making repairs, or for installing new connections on pipe 12¾-in. OD and above.

(b) Use E7016 low hydrogen-iron powder electrodes for all welds that are fused to the pipe wall, if the surface temperature of the pipe is below 50°F.

3 *General*

(a) The longitudinal seams of fittings designed to encircle the pipe shall be equipped with a steel backup strip to prevent the weld metal deposited in these seams from fusing to the wall of the carrier pipe.

(b) Carefully check all completed welds for underbead cracks with dye-penetrant material.

(c) The operating pressure in a pipeline at the location of welding shall be reduced to 200 psi before any welding is started. This pressure shall not be increased until all welding on a line is completed. ■

This article is adapted from a paper presented at the ASME Petroleum Mechanical Engineering Conference held in Dallas, Sept. 23-26, 1956.

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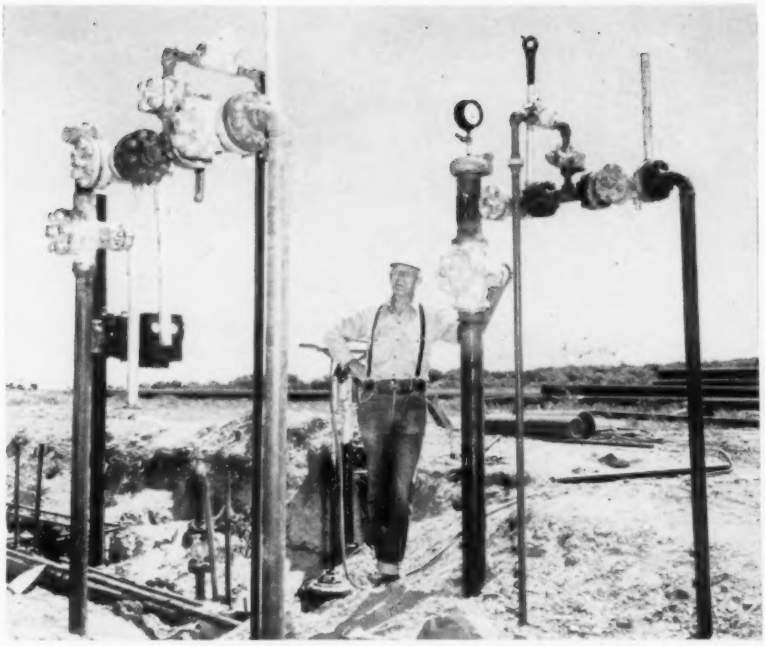
YOU CAN DEPEND ON DOW

Twenty-eight-year investment finally pays off



Marion Kline who waited 28 years for the gas supply at Piceance creek to find a market, stands beside gas headers at the General Petroleum unit. The unit has 10 wells, averaging from 3000 to 3700 ft in depth, ready to produce.

TWENTY-EIGHT years of waiting—and not to mention the hundreds of thousands of dollars invested—finally paid off in west Colorado recently when the Piceance gas field was tied into Pacific Northwest Pipeline Corp.'s *Scenic Inch*.

The field's potential as a source of gas has been known for years, but until Pacific Northwest came along, there was no way to get the gas from the field to customers who can use it.

Back in 1928, Magnolia Petroleum Co. started drilling for oil at Piceance creek, located 7500 ft above sea level in a wild and sparsely populated area. Independent operators knew there were oil sands to the east and the geology of the region and the drainage pattern gave every hope for oil.

There were no real roads, though, and the nearest town was 50 miles away. Horses and trucks with solid rubber wheels moved into the area by using dry creek beds for roads. But the nation was beginning to depend more upon oil and less upon coal for energy. New fields had to be found for an oil-hungry America. Magnolia's experts realized the obstacles, weighed them against the unknown potential, and accepted the challenge.

Three wells were drilled, and although the effort was not a failure, it was uneconomical. Commercial oil was not found, but gas was—lots of it. Yet gas, in a virtually inaccessible area—snowed in during winter and difficult to reach during the few good weather months of summer and fall—is useless without a market or a means of getting it to market. Neither a pipeline nor a market was readily available.

But Magnolia continued to poke around Piceance creek. The company was the southwest affiliate of what is now the Socony Mobil Oil Co. Inc. General Petroleum Corp., present operator and holder

Harold Theibolt (left) and Marion Kline prepare to turn on gas from the old Gladys Tittley well, which is the main connection between General Petroleum and Pacific Northwest at Piceance creek.

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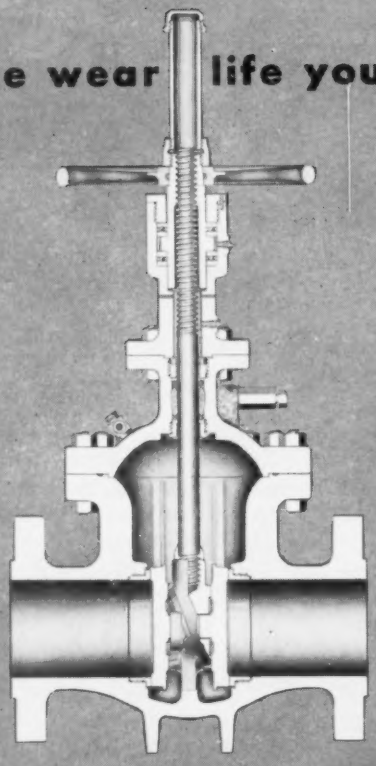

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Disc clearances are always accurate, because the two identical discs move up and down in machined body-guide ribs—which take the service abuse usually forced on disc faces in conventional double-disc gate valves, a frequent cause of damage and costly maintenance.

Consider and compare, too, the perfect disc alignment in this smooth-working Crane pipeline valve. Annular-shaped machined wedging surfaces keep both discs and the body ring seat faces lined up at all times—and, in addition, compensate for any slight body deflections caused by line strains.

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of the major interest in the Piceance Creek unit, was the far west affiliate and a realignment of operating territory brought the area under General Petroleum's jurisdiction.

General Petroleum's exploration, production, right of way, land departments—practically every department of the company at one time or another—kept alive the interest in Piceance Creek. The company didn't give it up, and neither did Marion Kline, who started in the field with Magnolia and for years was General Petroleum's sole representative in the area. So the company continued to explore and drill in this country which once was a Ute Indian hunting ground.

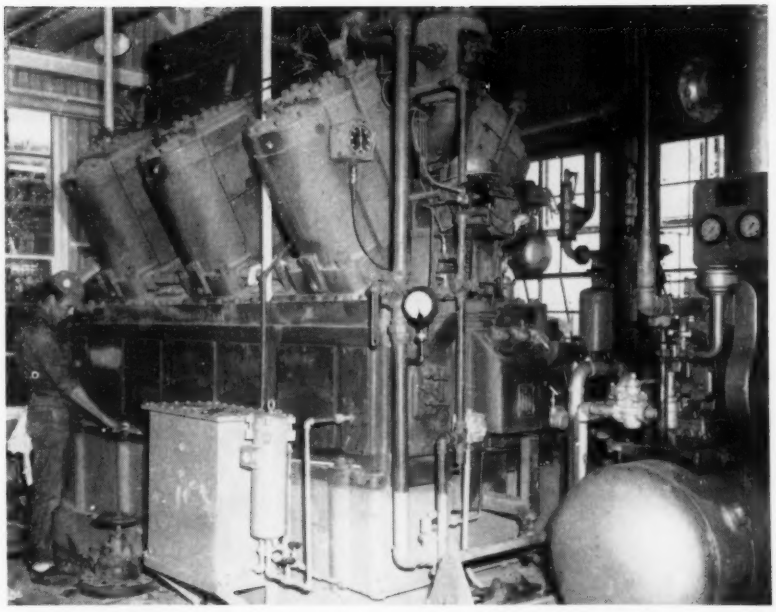
Dollars were poured into salaries, equipment, roads, leases, maintenance. The company was going through all the motions dollarwise that it would in any other producing field, except for one important fact—it was receiving no return on its investment.

Many false hopes were raised, like the time several small Colorado towns expressed an interest in buying the Piceance gas. But the Korean War broke out and plans for a pipeline were shelved.

But patience finally paid off, when Pacific Northwest announced its plans to build a line from the gas fields in the San Juan basin of Colorado and New Mexico into the Pacific Northwest. General Petroleum welcomed the project, for here, after 28 years of waiting and hoping, was the big opportunity to sell its shut-in Colorado gas.

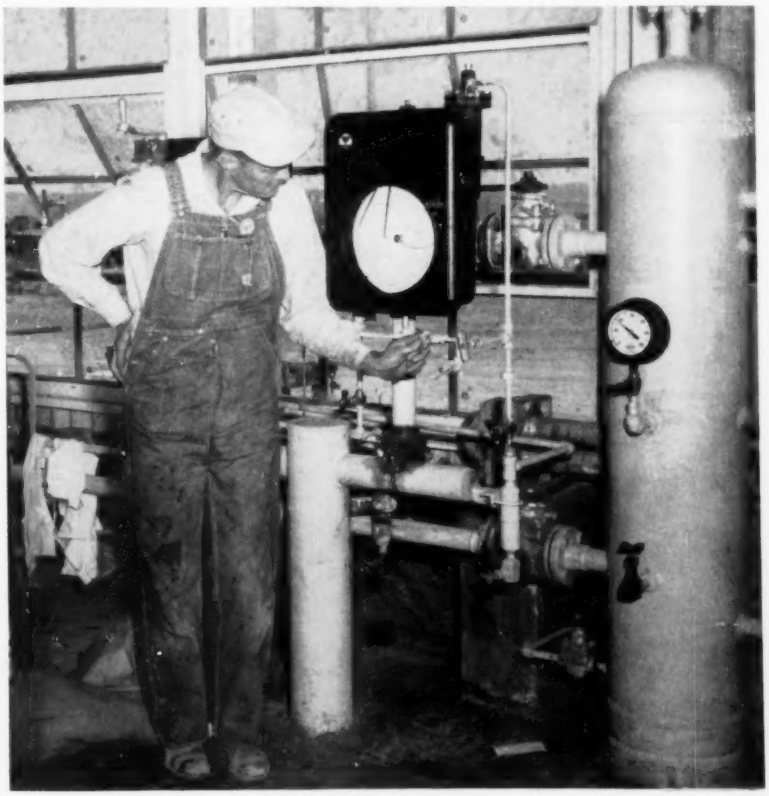
It is estimated that the acreage unit under GP's lease contains reserves of about 100 billion cu ft of gas. The 10-in. supply lateral connecting with the *Scenic Inch* is 48 miles long.

The future is bright for Piceance gas. Plans are under way which may take the gas across the Continental Divide to Denver and other points east. Now that the costly investment — more than $900,000 for operations alone—is beginning to repay itself, General Petroleum will be able to explore and try to develop other fields to satisfy the nation's ever-growing needs for gas and oil. ■



Final connection is about to be made at the pipeline field compressor station. From here the gas goes through a 10-in. pipe to Rangely, 48 miles away. At Rangely, it connects with the main 26-in. line to the Pacific Northwest. All this heavy equipment was trucked into the area in sections and then assembled.

On of General Petroleum's employees inspects gauges at the high duty, spherical liquid separator unit. Now that customers and a means to serve them have been found, General Petroleum expects to do some additional exploration in the area.



Extending through nearly 4 miles of rural Texas area, this Schedule 40 aluminum pipeline was buried completely devoid of protective coatings and anodes.

Unprotected aluminum line serving Alcoa plant in Texas

INSTALLATION of a corrosion-resistant aluminum pipeline to carry gas to the Point Comfort (Texas) plant of the Aluminum Co. of America has been completed.

Eight inches in diameter and nearly 4 miles in length, the line is reportedly the largest, longest unprotected aluminum gas transmission line now in service. It was installed by Lavaca Pipe Line Co. as part of the gas transportation system serving the Point Comfort operations.

Extending through rural area, the Schedule 40 pipe is buried in soil ranging from sand and gumbo to salty marsh. Completely devoid of protective coatings and anodes, the aluminum line is shielded only by electrical insulation at certain flanged joints. Anodes will be installed on test sections, however, to provide a detailed study of their effectiveness.

Alcoa is counting on the aluminum pipe to deliver long, efficient low service. Performance of the pipeline is expected to confirm the light metal's suitability for tough oil country use.

Lavaca Pipe Line men, installing the line, joined 40-ft lengths using the argon shielded tungsten arc and consumable electrode welding methods. The aluminum pipe was extruded at Alcoa's Lafayette (Ind.) works. Gas flows through the line at a pressure just under 500 psig to help meet the mounting fuel needs generated by the expansion program under way at the plant. The line has been tested at 800 psig, and has a calculated bursting pressure of 1500 psig.

Several years ago Reynolds Metals Co. laid an aluminum pipeline to serve its alumina plant at La Quinta, Texas. The 8⅝-in. line ran about 10 miles from the East White Point field near Corpus Christi. It has a capacity of up to 20 MMcf/day.

Although standard wrapping and coating methods were used on most of the line, a short length was left unprotected for testing purposes. According to Reynolds, no corrosion of this portion has occurred. ■

The 40-ft lengths of aluminum pipe were joined by the argon shielded tungsten arc and consumable electrode welding methods.

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GAS pipeline news

New wheel, crawler tractor line shown to press by J. I. Case Co.

The J. I. Case Co. introduced its new line of crawler and wheel tractors recently at a special press demonstration at its newly acquired Churubusco, Ind., plant.

Case, a long-time maker of wheel tractors and related equipment, is making its first entry into the crawler tractor field this year with its line of TerraTrac machines. Case recently acquired the American Tractor Corp., and has taken over the manufacture and marketing of American's line of crawlers. They will be marketed now under the name Case-TerraTrac.

A snow storm that arrived in Churubusco along with more than 50 industrial press editors failed to stop the demonstrations, although it did curtail some of the field tests slated for the proving grounds. Twenty gasoline and diesel-powered tractors, ranging from 40 to 80 hp in rubber tire equipment, and up to 100 hp in crawler models, are available this year.

Altogether there are over 50 combinations of matching backhoes, loaders, bulldozers, scarifiers, fork-lifts, trailers, and winches now available. Forty-two of these combinations were put through the paces at the recent demonstration.

Three of the most important advancements shown to the editors were a development referred to as "counter rotation," torsion bar suspension and centralized lubrication, all incorporated in the heavy-duty crawlers in the 80- and 100-hp class.

The counter-rotating feature of TerraTrac's hydraulic transmission provides complete independent power control of each track—both as to speed and direction. This is achieved by positioning four hydraulic clutches on either side of the center input shaft, thus giving the transmission both high and low speeds, plus forward and reverse on each side. As a result, if the tractor operator gets into a tight spot and wants to turn around in his own tracks, with a full load, he simply moves two hydraulic valve levers on the steering column and, presto—the machine makes a fast 360° spin-turn practically within its own length—with one track driving forward and the other in reverse.

If space is no problem, the operator can make smooth power turns by driving one track faster than the other in the same direction, or, if he wants to pivot-turn, he touches one of two hydraulic brake pedals, which automatically disengages the clutch and locks the track on that side.

Both machines have four speeds forward up to 6 mph, plus four reverse speeds to 7 mph. The constant-mesh Terramatic transmission enables the operator to change speeds or direction instantaneously, on the go, without touching a master clutch or stopping to shift gears.

These units are also equipped with a Borg-Warner torque converter drive, which is said to produce twice as much push or pull at slower speeds as the same horsepower tractor with conventional drive. For example, the 80-hp Model 800 is reported to develop in excess of 20,000 lb of drawbar pull or push, under ideal tractive conditions, whereas the 100-hp Model 1000 is claimed to be capable of producing a maximum pull of 24,000 lb.

Torsion bar track suspension makes it possible for each track to oscillate freely over irregularities in the ground surface. For example, one track can be run onto an obstacle 12 in. high and the other track will remain flat on the ground, with the loader bucket, or

New models of backhoes were demonstrated despite bad weather.

LADISH

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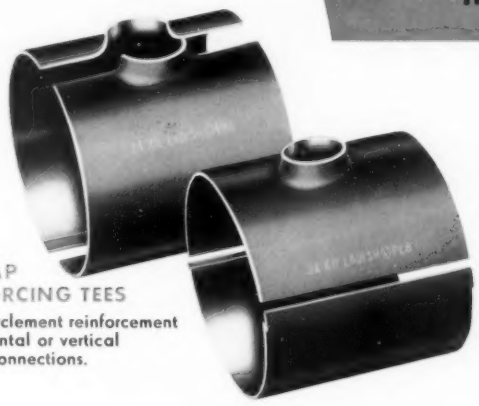

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BULLETIN 55-1

21-page bulletin presents descriptive data on Ladish pipe line fittings developments.

BULLETIN 55-2

82-page volume tabulates and graphically charts design pressures for steel pipe for gas transmission and distribution systems in accordance with recently revised Section 8 of ASA. B-31.1.8.

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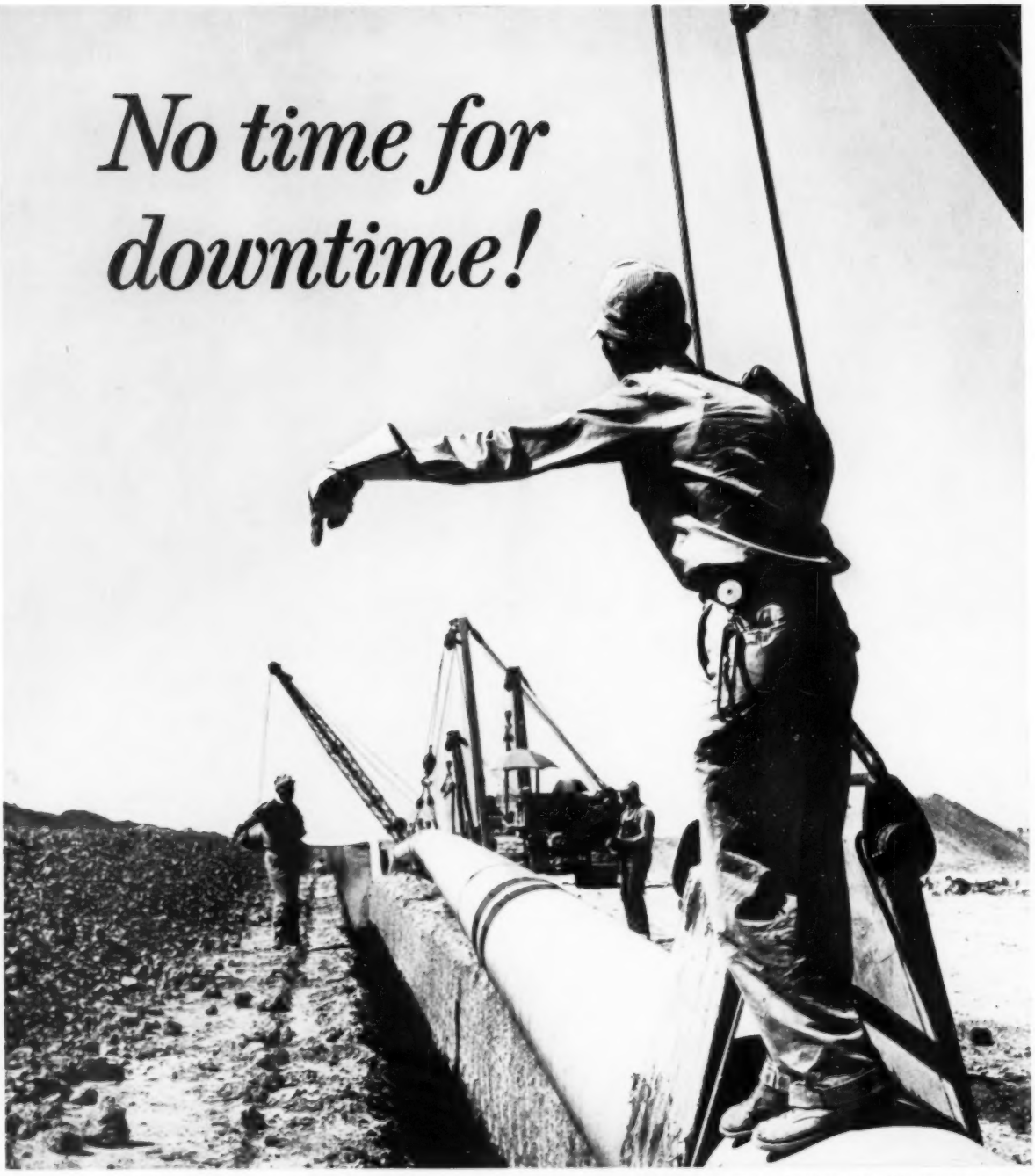

PACIFIC NORTHWEST PIPELINE CORPORATION PHOTOGRAPH

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'dozer blade, remaining perfectly level. This is achieved by means of torsion bars, which run the full length of the track on each side, with connecting linkage across the chassis to equalize the loads. Furthermore, the torsion bars bear in the exact center of each track frame, so there is no tendency to twist the frames.

This also enables the tractor to deliver full power and traction on both tracks when working in rough terrain, and maintains the loader or 'dozer cutting edge in a level position.

Canada's Union Gas sees successful year ahead

Union Gas Co. hopes to finally realize success this year in its long drawn-out efforts to obtain large volumes of natural gas for southwestern Ontario.

According to Thomas Weir, vice president and general manager, the company has for many years been seeking sufficient future supplies of natural gas to meet constantly increasing demands in its present market areas, and also the requirements of other areas where there is either no natural gas or insufficient supplies.

"With arrangements completed for large, long-term volumes of natural gas, the construction of pipelines and other facilities to carry this gas to the waiting markets will represent the largest single expansion program in the history of the company," Mr. Weir said.

Preliminary engineering plans have been completed, he said, and work has been under way for some time on other preliminary phases such as obtaining franchises and contacting landowners regarding rights-of-way.

"Orders have been placed for all the necessary pipe and some of the smaller sizes are already being delivered, but completion of the project depends on how soon the pipe mills can deliver the 140 miles of large diameter pipe required for the mainline," he said.

"Every effort is being made to obtain this pipe and the company hopes it may be able to complete construction of the line from its underground storage area in Lambton county to the vicinity of Hamilton by the fall of 1957."

The project, according to Mr. Weir, will bring increased supplies to present market areas; enable the Hamilton area to convert from manufactured to natural gas; supply natural gas for the first time to Stratford, Kitchener, Waterloo, Guelph and other smaller communities; and also make supplies available to other companies distributing in the area.

Stratford and Guelph have granted distribution franchises to Union Gas and negotiations on distribution arrangements are now being carried on with Kitchener and Waterloo. As for the Hamilton area, Union Gas will supply natural gas for United Gas & Fuel Co. and United Suburban Gas Co., which already distribute gas in that area.

The route of the line has been surveyed, and every farmer and landowner along the way has been contacted. The company has met various county farm organizations as well as the Ontario Federation of Agriculture, and at the present time is negotiating with the Ontario federation on a new form of ROW agreement.

In 1956 the company was successful in obtaining approval for additional imports of U.S. gas which will be used to build up the Ontario markets prior to arrival of Alberta gas. In June of last year, the FPC authorized export of additional annual volumes of up to 15.5 billion cu ft—the volumes provided for in a contract with Panhandle Eastern Pipe Line Co. in April 1954. Deliveries of this new gas began on Nov. 5, 1956, although only small quantities can be taken now. The larger volumes will have to await completion of the new line.

As for Alberta gas, Union Gas first signed an agreement with Trans-Canada Pipe Lines Ltd. in January 1955 for a supply to ultimately replace the U.S. gas, the contract volumes being essentially the same as those in the 1954 Panhandle contract. However, because of delays in completing arrangements for delivery of the gas, Mr. Weir said, Trans-Canada and Union Gas amended the contract last June to provide for much increased volumes, particularly in the later years of the 20-year contract. The maximum volume available to the company in the later years is 65 billion cu ft/year.

"Union Gas will discontinue taking U.S. gas under the April 1954 Panhandle contract after Alberta gas becomes available to it in Ontario," Mr. Weir said.

In addition to these two major sources, Union Gas continues to produce and purchase Ontario gas. Out of a total gas use of 13.9 billion cu ft in the last fiscal year, approximately 8.5 billion came from Ontario sources.

Westcoast, Phillips sign 125 MMcf/day contract

Phillips Petroleum Co. has signed a contract with Westcoast Transmission Co. Ltd. for sale of up to 125 MMcf of natural gas per day. The gas, from the Savanna Creek area in the foothills of southwestern Alberta, is slated for ultimate delivery to the U.S. at the Idaho border.

"This transaction will bring the highest prices of any Canadian gas sales we know of and will furnish an outlet for gas discovered on the 78,000-acre block which Phillips and others are developing at Savanna Creek," Phillips president K. S. Adams said.

According to contract terms, Phillips will receive prices at the wellhead escalating progressively from 10.4 cents to 19 cents/Mcf of pipeline gas, plus 1 cent more per Mcf starting at the time the new line attains a sales volume of 250 MMcf/day. Westcoast will gather the gas at the wells and will treat and otherwise condition the gas for pipeline delivery.

Westcoast will spend $55 million to enlarge its mainline across British Columbia and $45 million for a sulfur plant and a line from the Savanna Creek field, Frank M. McMahon, president, reports. The 30-in. line from Savanna will run 174 miles to Kingsgate B.C., where export of some of the gas will be made to Pacific Northwest Pipeline Corp.

Arm's-length bargaining doesn't get rate hike

An FPC presiding examiner has filed a decision disallowing 12 natural gas rate increases—all proposed under escalation provisions of the gas purchase contracts.

The increases, totaling about $76,508 annually, were filed by 11 independent producers and would have affected Cities Service Gas Co., Oklahoma City.

The producers, which are proposing to increase their rates from 7.5 cents to 8.5 cents/Mcf, have been collecting the higher rates since May 1955, subject to refund. The decision—subject to review by the commission—requires the producers to complete the refund

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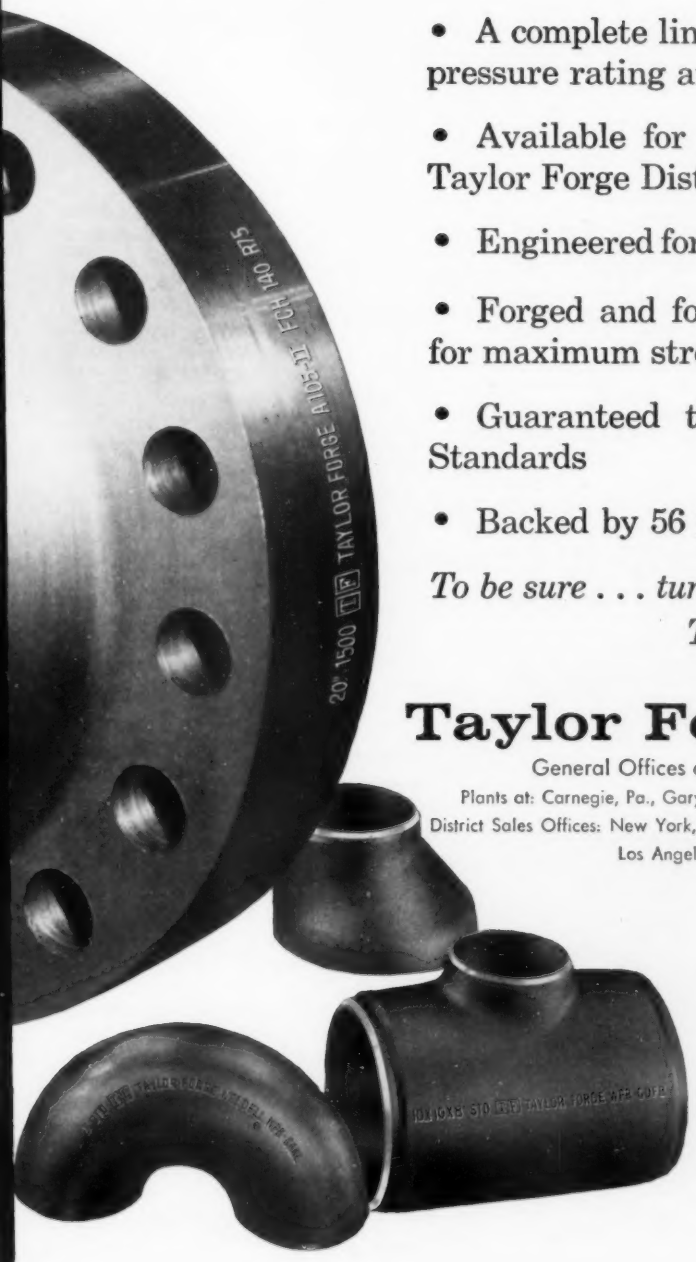

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of all excess amounts to Cities Service within 30 days, plus interest at the rate of 6 per cent per year.

Presiding Examiner Daniel J. Kelly said that the producers were on notice from previous FPC actions that something more than evidence of arm's-length bargaining and field price were required to be presented in this proceeding if they were to sustain the burden of showing the increased rate to be just and reasonable. "That something more is lacking in this record," he declared.

He said that the commission's Dec. 6, 1956 opinion in the Union Oil Co. of California case "is controlling here," and that there is no position taken by the producers in this case which was not rejected, directly or by inference, by the FPC in the Union opinion.

The presiding examiner also said that what "the commission is urged by the applicants to do in the present case is, in effect, to permit the independent producer to sell his gas in interstate commerce without regulation by the commission." Continuing, he said that there is no evidence in this record from which it may be determined whether the proposed 8.5-cent rate is just and reasonable, within the meaning of the Natural Gas Act, from the standpoint of either the investor or the consumer. Certainly, he said, "there is no showing whatever that said rate is no more than is necessary to encourage production of natural gas." He declared that, in effect, "nothing more has been shown by the relevant and pertinent factual evidence here than that said rate was agreed upon by the contracting parties dealing at arm's length, and that it is lower than the prevailing field or area price for gas. In addition to this factual evidence there is nothing in the record except testimony concerning economic theories."

The gas is produced under a unitization agreement, with Sohio Petroleum Co., Oklahoma City, acting as the operator.

How to ship 80-ft long steel pipe on 53½ ft flat cars was a problem recently when U. S. Steel's Consolidated Western Steel division put a new welding machine in operation which welded together two sections of 40-ft long pipe. Load specialists from three western railroads put their heads together with engineers from Pacific Gas & Electric and Consolidated and came up with the solution: Idler cars were placed between each load—five cars handling two loads. And, according to reports, it works fine—no trouble with mountain switchbacks and curves.

Ark-La's $6 million project approved

The FPC has issued a certificate to Arkansas Louisiana Gas Co., Shreveport, authorizing it to construct and operate gas facilities estimated to cost $6.6 million (Docket G-10887).

About $2.3 million of the facilities were scheduled for construction in 1956 and the remainder this year. None of the proposed facilities will increase the sales capacity of the system.

The facilities are designed to enable Ark-La to sell gas to industrial consumers or to connect additional gas supplies to its existing system.

Operating okay granted Gulf Interstate

Gulf Interstate Gas Co., Houston, has a temporary FPC permit to operate facilities now under construction in Louisiana, Mississippi, Tennessee, and Kentucky (Docket G-10841).

Last September, the FPC granted Gulf Interstate temporary authorization for the $8.9 million project which consists of a 2000-hp addition to the Acadia, La. compressor station; a 3500-hp addition at Stanton, Ky.; installation of 3500-hp compressor stations at Rapides, La., Humphrey and Alcorn, Miss. and Macon, Tenn.; and miscellaneous gathering lines and measuring stations to connect new supplies of gas contracted by United Fuel Gas Co. in south Louisiana.

The additional facilities will increase Gulf Interstate's daily design capacity from 401 MMcf to 448 MMcf.

Permian contracts with Pioneer for new supply

Permian Basin Pipeline Co., Omaha, is seeking authority from the FPC to build the necessary facilities to take gas from Pioneer Gathering System Inc. in the west central Texas area. Permian has entered into a contract with Pioneer calling for deliveries of gas in amounts up to 200 MMcf/day at a point in Schleicher county, Texas. Initial deliveries, scheduled to begin this year, will be in excess of 50 MMcf/day.

Permian will construct 83 miles of 16-in. line from existing facilities near its Spraberry compressor station in Midland county, Texas to tie in with Pioneer's system at a point in Schleicher county. Permian will also build a 3960-hp compressor station. Estimated cost of the project is $5 million.

Gas and oil properties bought by Tennessee Gas

Producing and undeveloped oil and gas properties have been acquired by Tennessee Gas Transmission Co. in Texas, Louisiana, Oklahoma, and Kansas. The deal, involving about $8 million, includes an interest in 208 producing gas and oil wells.

Three separate purchases were involved. Properties in the Gulf coast area of Texas and in northern Louisiana were acquired from Sam E. Wilson Jr., in Kansas from H. C. Bennett and C. L. Roberts, and in Oklahoma from Kirkpatrick Oil Co.

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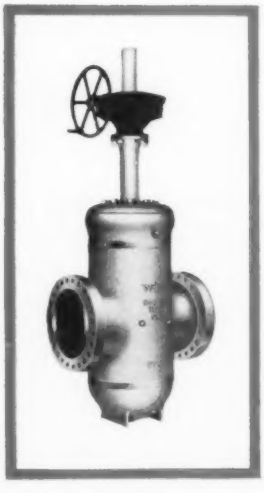

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In addition to 11,729 net producing acres acquired in the transactions, undeveloped acreage with semi-proven locations was included. The purchases added 13 MMcf/day of natural gas and 2400 bbl of oil to the average daily net production of Tennessee Gas.

Temporary sales made under new regulation

Following a recent change in FPC regulations, six independent gas producers have been notified that they may institute temporary sales pending final commission action on their certificate applications.

The six producers are the first to be notified that they may commence service under the regulation issued Nov. 20, 1956. Under the procedure, a written notice of the proposed temporary service must be filed with the commission. However, service may not commence until the FPC's secretary notifies the producer of the commission's acceptance of the statements and of the applicable rate schedules contained in the notice.

The Nov. 20 amendment promulgated two new sections which provide that in the event of an emergency, an independent producer may institute temporary service and continue it pending final action on the certificate application.

J. B. Beaird Co. merges with American Machine

J. B. Beaird Co., Shreveport, manufacturer of packaged compressors for the gas and oil industry, was merged with American Machinery & Foundry Co., New York, late last year.

The merger involved a transfer of stock. Beaird's 10,000 shares were exchanged for approximately 155,000 shares of AMF, a 15-1 transaction.

No changes in operation or policy are contemplated by Beaird, which operates plants in Shreveport, Clinton, Iowa and Stockton, Calif. Early in 1956 it acquired the tank manufacturing facilities of Butler Manufacturing Co. in Galesburg, Ill.

Officers of Beaird are J. Pat Beaird, president and general manager, Charles T. Beaird, vice president and assistant general manager; J. G. O'Brien, vice president and treasurer; Justin R. Querbes Jr., assistant secretary; C. N. Wibker, vice president; L. J. Sarosdy, vice president, engineering; J. L. Tullis, vice president, sales; Melvin Johnson, secretary; R. T. Buffington, assistant secretary; and B. S. Herring, assistant treasurer.

Morehead Patterson is president and board chairman of AMF. His vice chairman is Gen. Walter Bedell Smith, chief of staff to President Eisenhower during World War II and former ambassador to Russia.

Iroquois, Republic merge okay with commission

Iroquois Gas Corp. has been authorized by the FPC to acquire all of the natural gas facilities of its affiliate, Republic Light, Heat & Power Co., that will be subject to commission jurisdiction after the acquisition. Both companies are subsidiaries of National Fuel Gas Co. and all headquarter in Buffalo, N. Y.

The facilities which Iroquois will acquire consist of a system used in the transmission and retail distribution of natural and mixed gas in Chautauqua, Niagara, Gennessee, Livingston, Ontario, and Erie counties, N. Y. Included are natural gas production and gathering plant, underground storage facilities, local gas storage plant, transmission and distribution facilities, and general plant.

The merger is to be accomplished by the conversion of Republic's 96,746 outstanding shares of $100 par common stock into one share each of Iroquois' $100 par common stock. No other consideration will be paid. Purpose of the merger, Iroquois said, is to simplify the corporate structure of the National group of companies, to complete the unified administration of the two organizations, and to effect economies of operation.

FPC okays Cities Service system expansion

Temporary authorization has been granted Cities Service Gas Co., Oklahoma City, for additional facilities in Kansas, Missouri, and Oklahoma (Dockets G-10934, 9887, and 10520).

Under Docket 10934, the company plans to lay about 60 miles of line in the Eureka area in Grant and Alfalfa counties, Okla., at a cost of $1.2 million. Cities Service has entered into contracts to purchase dry and casinghead gas from producers in the two counties and the new line will bring the gas into its pipeline system.

Under Docket G-9887, Cities Service will drill and connect 55 injection and withdrawal gas wells in the McLouth storage field in Leavenworth and Jefferson counties, Kan.; install 6750 compressor horsepower in stations located in Leavenworth and Anderson counties, Kan., Cass county, Mo., and Oklahoma county, Okla.; construct approximately 25 miles of 16-in. line in Buchanan county, Mo., 3.4 miles of 16-in. line in Platte and Leavenworth counties; approximately 3.5 miles of 12-in. line in Johnson and Lafayette counties, Mo.; and 3 miles of 6-in. line in Lincoln county, Kan.

Docket 10520 authorizes the following construction (all in Oklahoma): 11.7 miles of 30-in. line replacing existing 20-incher; 17 miles of 20-in. loop; addition of turbocharging equipment to two 1100-hp compressors.

PNW subsidiary buys assets of producer

Northwest Production Co., a subsidiary of Pacific Northwest Pipeline Corp., has bought the assets of Wyo-Fields Oil & Gas Co., Salt Lake City.

Involved in the transaction is the exchange of one share of Northwest Production for about 4½ shares of Wyo-Fields. Wyo-Fields holds about 240,000 acres of oil and gas leases in Montana, Wyoming, Colorado, and Utah.

Pioneer Natural expands gathering, production

Pioneer Natural Gas Co., Amarillo, Texas, has acquired Pioneer Gathering System Inc. and has formed Pioneer Production Corp.

Pioneer Gathering, now a wholly owned subsidiary of Pioneer Natural, was organized to purchase and gather gas in a portion of west central Texas which has not previously had adequate market outlets. Operation of the gathering company will permit producers to sell from gas fields and will aid in the conservation of large volumes of gas produced in conjunction with oil.

Pioneer Gathering has also en-

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tered into an agreement with Permian Basin Pipeline Co., Omaha, calling from daily deliveries of up to 200 billion cu ft of gas.

Heading Pioneer Gathering is Burton P. Smith, who is a director, vice president and treasurer of Pioneer Natural. C. W. Pankratz is vice president and chief engineer.

C. I. Wall, president of Pioneer Natural, said that the newly formed production company has contracted to sell the gathering subsidiary substantial volumes of gas. It is engaged in a drilling program in Sutton county, Texas, and will carry on drilling operations in other Texas areas as well as over the Mid-Continent area.

A. F. Cox, president of the Amarillo Oil Co., has been named president of the new producing company. T. S. Whitis is vice president.

Florida plan okayed, but with strings

What has been termed an almost killing action was taken by the Federal Power Commission when it conditionally authorized construction and operation of the Houston Texas Gas & Oil Corp. — Coastal Transmission Corp. project to bring Texas gas to Florida (Dockets G-9262 and 9960).

In a 3-2 vote to issue the certificate, the commission imposed substantial conditions requiring both companies to make changes in their tariffs and plans of financing to eliminate "objectionable" features.

Coastal's 574-mile system will extend from southern Texas to the east bank of the Mississippi river where it will connect with the proposed facilities of Houston Texas, which will build its 942-mile mainline across the Gulf Coast states and down the Florida peninsula to a point near Miami.

Although the commission found that the companies have a gas supply fully adequate to support their proposed projects and that there exists in Florida both a desire and need for natural gas with markets "ready and waiting," it said that the proposals involve features which are objectionable and which call for the imposition of corrective measures. The FPC said that while the conditions it was imposing "are substantial, the only alternative is to deny the applications." It said that "The source we shall pursue leaves open the possibility that applicants can overcome the deficiencies . . . and thereby attain the objective of paramount concern to all in this case."

The conditions require both Houston and Coastal to file gas tariffs within 30 days (from Dec. 28), eliminating or revising certain features of their previous filings, and to submit their financing plans to the commission for approval prior to putting them into effect.

Houston must make each class of service bear its proper share of the costs, based on a 6 per cent rate of return; eliminate the cancellation and reduction-in-take provisions in the transport agreements with two power companies it proposes to serve; modify its minimum bill provisions; eliminate the cancellation provisions in the contracts covering direct primary interruptible service.

Coastal's tariff must provide separate charges applicable to gas sold to Houston and to that transported for the power companies. Such separate charges shall be based on a reasonable allocation of costs between the two services in accordance with usual FPC standards. Charges for the first six months of operation shall be based on a 6 per cent rate of return, with charges for succeeding six-month periods on the overall rate of return of the two companies for the preceding six months, but not more than 6 per cent. Also, the commission's opinion required Coastal to credit Federal income tax accruals in its allowance for working capital; to eliminate an escalation provision applying to gas from Coastal's own reserves; and to modify the provision which gives credit to Houston when Coastal removes heat content from gas which it purchases and transports, so that it applies also to gas from Coastal's own production—or else eliminate the credit completely.

In his dissenting opinion, in which Commissioner Arthur Kline joined, Commissioner William Connole said that the conditions imposed by the majority "confirm the fact that the project as proposed is economically impossible of completion." He said that even in the form it would take if the conditions were met, "it would contain so many compromises with principle and rest on so much speculation for its success that the (Natural Gas) Act does not permit a finding that the public convenience and necessity requires its construction and operation."

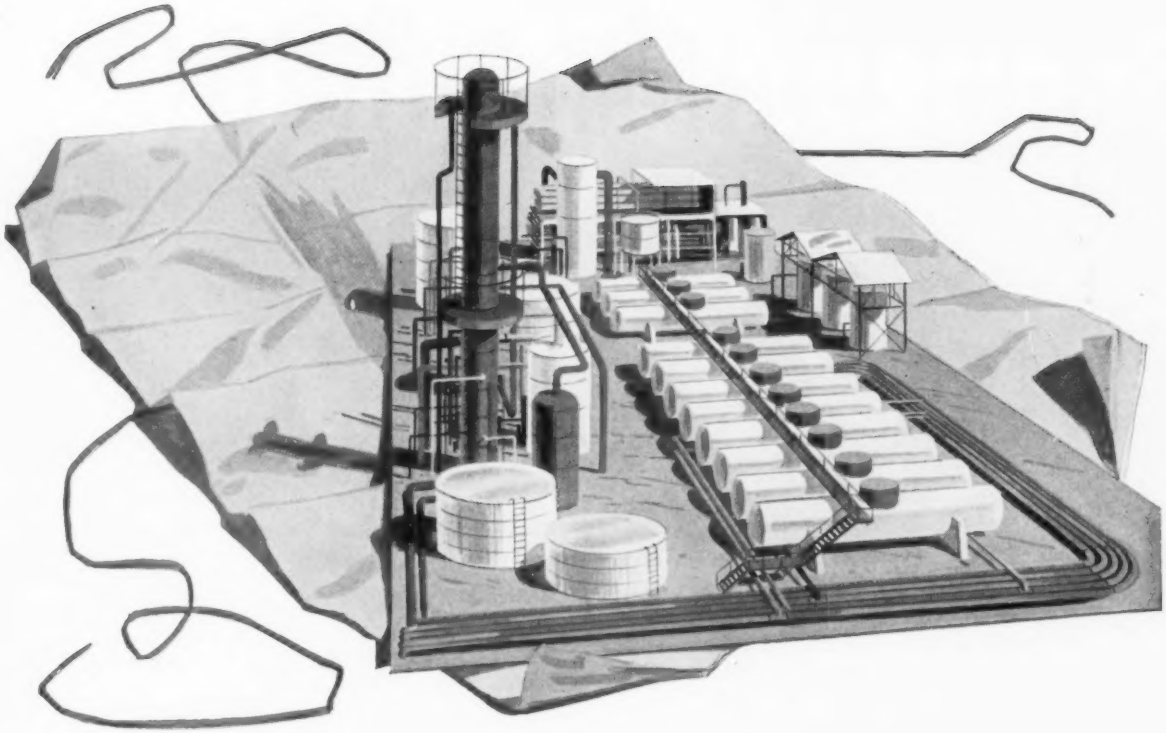
Pointing to the "infirmities" in the transportation arrangement between the applicants and the power companies, he said that the majority — having rejected that proposal, "offers an alternative which is not a practical one nor one which, in my opinion, would solve the problem." Commenting on the tariff conditions imposed by the majority, Commissioner Connole said that the resultant rates, especially those for transportation, "will raise the price of applicant's service beyond economical tolerance."

Noting that the Florida power companies have made it clear that they are interested in gas only if it is cheaper than alternative fuels, he declared that to expect a major utility to increase its purchased fuel operating expenses in order to subsidize the development of the only significant competing source of energy is "stretching one's confidence in corporate maganimity to the breaking point." Commissioner Connole said that huge volume sales of natural gas for boiler fuel are difficult enough to justify even when there is no question of the availability of more abundant and less critical fuel as in this case. "But in this proceeding," he asserted, "there will be none of the savings sometimes made available to electric utilities purchasing boiler fuel gas and no distinguishable advantage to the public interest sufficient to justify consuming some 150 MMcf/day or more in the interest of bringing natural gas into an area by this particular project."

In concluding, he said that the project as approved requires the filing of a rate to the users of 60 per cent of the capacity "which it is unrealistic to expect would ever be accepted and if accepted would be used for a very short period. Consideration of public policy or national defense which might motivate acceptance are beyond our jurisdiction to consider or to implement. Therefore, as much as 60 per cent of the line capacity would soon be unused. No firm market nor supply has been shown for that much unused capacity on this record."

Under the conditional authoriza-

(*Continued on page* 138)



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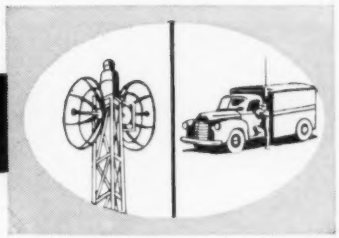

By FRANK CHAPMAN

The media for supervisory control

THE purposes of a supervisory control system are basically to select and remotely control a two-state device, to determine and indicate the condition of the device controlled, and to make a connection to remote telemetering equipment. Although the various methods currently employed and available to handle this function are many, the principle remains fairly simple and makes use of long recognized techniques.

Of these many systems the one which has been in use for the longest period of time is that using direct current impulses over an ordinary pair of wires. This is nothing more than the old Morse telegraph system. However, refinements to the system have been made in recent years to include coded pulse systems which are capable of performing a great many different functions over the same pair of wires.

These more advanced systems use a series of coded pulses wherein only a part of the total signal is used, and for further reliability the codes are sent twice and compared at the receiving point. If all conditions of the coded pulses are not met the equipment is programmed to fail safe. In addition, provision is included to permit the receiving point to reply and "inform" the controlling point when an operation has been completed or, in the case of a slow acting device, in the process of following the instructions transmitted.

The fact that the speed of transmission of direct current pulses over ordinary wire lines is limited presents no problem because equipment such as large valves are also comparatively slow in completing operation. Even on faster operating equipment the very high speeds are not required. Speed is far less important than reliability.

A greater spectrum of control functions, limited only by the capabilities of the communication medium, are possible with tone frequencies for control and telemetering purposes. Among these is the Hammarlund "centralized operations control" system which makes use of a band of frequencies between about 400 cycles and over 6000 cycles. Signals may be keyed up to 40 pulses a second for the higher frequency equipment.

The system consists basically of a very stable tone generator and amplifier at the transmitting point and an audio tone receiver and filter section at the receiving point. In this system, also, the operation of the controlled equipment causes a supervision tone to be transmitted back to the control point where it operates a lamp or otherwise indicates a completed sequence.

Hammarlund tone equipment is also used for transmitting metered data from remote points to a central control center. This may be of an impulse-duration type transmission, or audio or frequency modulation. A large number of information channels can be made available for continuous readings over a single communications circuit by using this equipment. In addition, continuous readings of remote operatings may be obtained while performing controls.

An adaptation of the tone system is the frequency code telemetering system that makes use of a several digit code. This is the system commonly used for indicating shaft rotation, and can be used in conjunction with the above control systems to indicate the shaft position on a controlled valve.

The gamut of tones that are transmitted in a system of this type makes it inherently foolproof as well as being capable of relatively high speeds. In a manner of speaking the code is similar to that used on a direct current pulse system except that the entire code is sent simultaneously rather than in a sequence. This permits a comparison of tones for greater reliability.

The one remaining basic system is the full frequency modulation system which has found common use in reading out measurement transducers such as those reading temperature, shaft rotation and similar variables. This technique was originally put into operation on the Gulf Interstate compressor station installations, and was designed and installed by the Berkeley Division of Beckman Instruments. When the output of a transducer is a varying frequency it is convenient to use this frequency, provided it is within the range of the communication medium, to

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Lone Star electric weld line pipe has uniform wall thickness in every joint. Quick, accurate field-joint line-up and outstanding weldability . . . plus easy-to-bend characteristics . . . mean faster construction schedules. Plus value: year-after-year of trouble-free service.

Lone Star API line pipe, casing and tubing . . . made in Lone Star's ultra-modern plant . . . are quality-controlled from mining of the ore through the fine, finished products in the pipe mills. Lone Star is a completely integrated operation . . . dedicated to serving the oil and gas industries.

Neighbor, wherever you are, specify Lone Star and we both get a good deal!

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communications • *Cont'd.*

transmit the information to a distant point.

Other applications of the FM system of supervisory control and telemetering are sure to appear on the scene. The use of FM as a means of transmitting variables developed by transducers is only the beginning in this area.

With the know-how currently available to the gas company engineer on the various types of control and telemetering techniques it only remains for him to choose that type which best suits his own particular application. Factors in the decision as to type include the kind of communications medium, the volume and speed of transmission required and the distance over which the transmission is to be made. Knowing these factors the design of the entire system is merely the process of investigating the various available types that are suited to the problem at hand.

Paul Galvin

Robert Galvin

Management promotions announced by Motorola

The Motorola board of directors recently elected Paul V. Galvin chairman of the board. Succeeding him as president is Robert W. Galvin, formerly executive vice president.

Approval was also given the establishment of five newly defined major products divisions — consumer, automotive, industrial, semiconductor, and military products. Daniel E. Noble, vice president, was elected executive vice president in charge of the redesigned Communications and Industrial Electronics division, the Semi-Conductor Products division, and the Military Electronics division.

(*Continued on page* 136)

(Left) NO-OX-ID and NO-OX-IDized Wrapper application by Traveliner. (Right) NO-OX-ID kettle.

3-PIECE OUTFIT FOR WELL-DRESSED PIPE

This carrier pipe is being well dressed for years of uninterrupted service underground. A 3-piece outfit—cleaning machine, dope kettle and Traveliner—does the job.

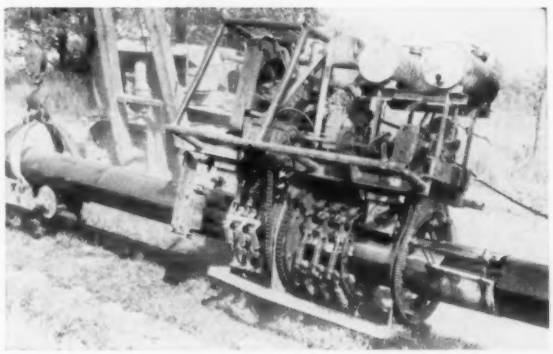
The dressing? NO-OX-ID Coating and NO-OX-IDized Wrapper—a combination that provides chemical-mechanical protection against corrosion and destructive soil action. NO-OX-ID is applied hot or cold by hand or machine...over the ditch or at the mill. No noxious fumes. You save on material because less NO-OX-ID coats more pipe per day. NO-OX-ID Coating and Wrapper combinations shield against corrosion attack.

On your next transmission or distribution line coating job, consult with your Dearborn Pipeline Engineer. Ask him to recommend the NO-OX-ID combination best suited to your requirements. Cost is reasonable and the protection long lasting. The best dressed pipe is NO-OX-ID PROTECTED!

Mail coupon for factual information on NO-OX-ID Coatings and NO-OX-IDized Wrappers

Dearborn NO-OX-ID®

Specify NO-OX-ID combinations for long-term protection



Cleaning and priming prior to coating.

Dearborn Chemical Company
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☐ Send me NO-OX-ID Coating Combinations literature
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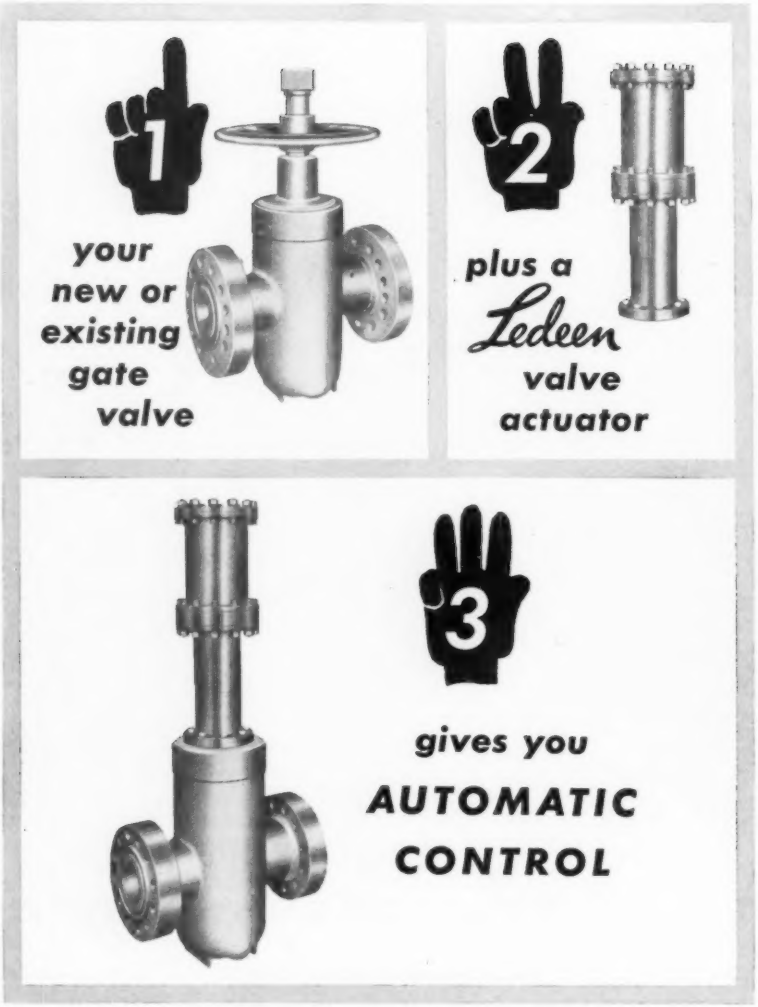
Name.....*Title*.....

Company.....

Address.....

City.....*Zone*.....*State*.....

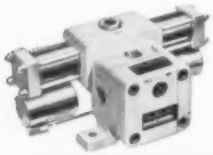


SIMPLE AS 1 2 3

Without interruption of service, and with only slight modification, every rising stem gate valve in your line can be converted to automatic control by the simple and easy process of installing Ledeen Valve Actuators.

Pneumatically or hydraulically operated, these valve actuators are adaptable to gate, diaphragm and plug valves for direct or remote control.

Ledeen Valve Actuators are available in a wide range of stem pull capacities.



Control your Ledeen Actuators with Ledeen Valves

Write for Bulletin 3030

VALVES • CYLINDERS
VALVE ACTUATORS
AIR-HYDRAULIC PUMPS
AND BOOSTERS

Ledeen Mfg. Co.
3334 North Gilman Road
El Monte, California

communications • *Cont'd.*

from page 134

Arthur L. Reese was advanced from general manager of the former industrial electronics and communications products department to vice president and general manager of the new Communications and Industrial Electronics division.

Arthur Reese

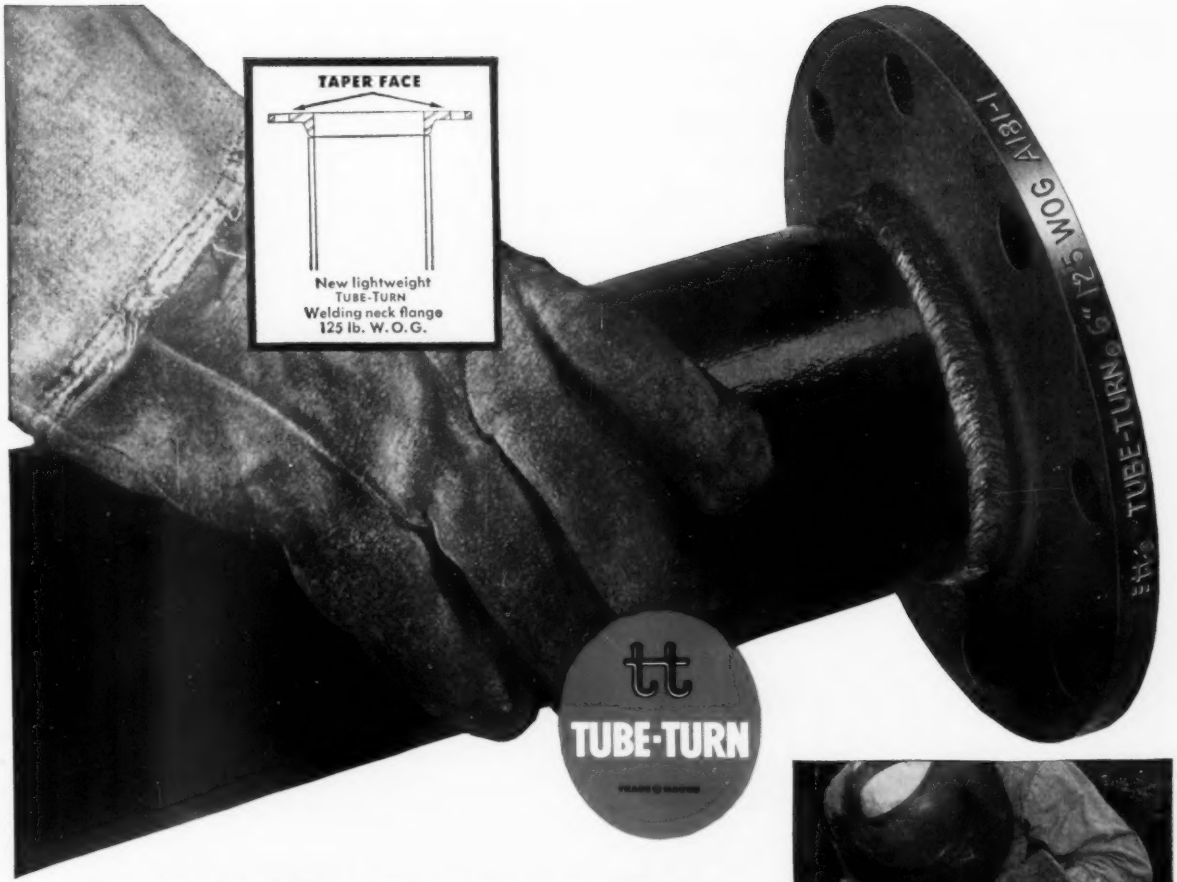
Daniel Noble

Other promotions in the Industrial division include Roy Olson to manager, microwave and industrial control products department, Angus Macdonald to director of engineering, and William Weisz to chief engineer of the mobile and portable communications products engineering department.

GE announces new communications setup

General Electric has created a new operating department geared to meet the demands of a constantly expanding communications market. Known as the General Electric communication products department, the new section will absorb functions previously handled by the company's communication equipment section. Products of the new department will include mobile radio, microwave radio relay, radio traffic coordination units, power line carrier equipment, terminal equipment and other communication systems.

In making the announcement of the development, Harold A. Strickland Jr., general manager of GE's Industrial Electronics division, disclosed that Harrison Van Aken Jr. has been promoted to the post of general manager of the new organization. Mr. Van Aken formerly headed the communication equipment section. Headquarters of the communication products department are at Electronics Park, Syracuse, N. Y.



NEW! TUBE-TURN "taper face" flange

cuts cost of low pressure distribution lines

protects low pressure valves

TUBE TURNS announces a new lightweight welding neck flange for service up to 125 lb. W.O.G. pressure, offering two important cost-cutting advantages: (1) It is priced lower than conventional flanges. (2) Its tapered face affords an effective seal with reduced bolt-loading on valves; hence, permits use of forged steel butt-welding neck flanges without danger of cracking the flat-faced cast iron flanges of valves.

This Tube Turns' development can help you cut the cost of distribution lines . . . especially when teamed up with lightweight pipe and fittings! Write for complete details.

*"TUBE-TURN" and "tt" Reg. U.S. Pat. Off.

NEW FLANGE, *teamed up with lightweight pipe and* TUBE-TURN* *Light Weight Fittings, offers advantage of lower price for light-duty pipe line materials.*

LOWER VALVE COSTS *can be realized because new flange permits use of low pressure valves without danger of cracking their flat-faced cast iron flanges.*

TUBE TURNS

LOUISVILLE 1, KENTUCKY

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

DISTRICT OFFICES: NEW YORK • PHILADELPHIA • PITTSBURGH • CLEVELAND • DETROIT • CHICAGO • KANSAS CITY
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pipeline news • *Cont'd.*

from page 128

tion of the combined $139 million project, Coastal will supply all of the requirements of Houston, its only customer. Deliveries initially will average 248,642,000 cu ft/day, with a maximum of 273,506,000 cu ft daily. Approximately 150 MMcf of this gas will go for boiler fuel use. Under a transportation arrangement, the two power companies will buy gas in producing fields in Texas and Louisiana. The gas will be received initially by Coastal, for transportation successively by it and Houston for delivery to the power companies in Florida for a transportation charge.

El Paso gets okay but supply concern revealed

California customers of El Paso (Texas) Natural Gas Co. will get an additional 150 MMcf/day of natural gas under terms of a certificate issued by the Federal Power Commission (Docket G-10499).

The $84 million project includes a total of about 290 miles of line and 56,950 hp in compressor capacity on El Paso's system in Texas, New Mexico, and Arizona. The facilities will be used to deliver an additional 75 MMcf/day jointly to Southern California and Southern Counties Gas companies, Los Angeles, and an additional 75 MMcf/day to Pacific Gas & Electric Co., San Francisco. The gas will be delivered through existing delivery points at or near the Arizona-California state line.

In granting the certificate, the FPC pointed out that the record in the case shows that after 1958 the requirements of El Paso's present customers will exceed the company's ability to supply them with gas. Although the FPC said that under the circumstances of this case "we do not feel it appropriate to condition this certificate upon a solution of El Paso's overall gas supply problems," it declared that the company would be required in its next certificate proceeding to present "a definite program demonstrating how its future system requirements are to be met and how the ultimate consumers will be protected."

The commission noted also that El Paso's plan of financing for the project will reduce the common equity of its capitalization from 21.15 per cent, to 19.85 per cent, and said that in its next certificate proceeding the company would have an opportunity to present a financing program showing a continuing improvement of common equity ratio.

Approximately 50 MMcf of the additional gas for the new project will come from fields in the San Juan basin in northwestern New Mexico and southwestern Colorado; about 75 MMcf from the Panoma field in Texas Panhandle, with this gas being exchanged for an equal quantity of gas from the Permian basin in Texas; and approximately 25 MMcf from the Permian basin.

The commission voted four to one for issuance of the certificate, with a dissenting opinion by Commissioner Arthur Kline.

In a concurring statement, Commissioner William R. Connole said that "in view of the failure of the proof to meet commission minima in the vital matter of the company's ability to serve even its present customers after 1958," El Paso should be required to submit "acceptable proof of deliverability of

Less Breakage at Low Temperatures
COSTS LESS ON THE PIPE
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also...

Glass, Asbestos and Kraft Wrap . . . Rock Shield . . . Coating & Wrapping, Cleaning & Priming Machines . . . Tar Kettles, Patch Pots, Burners & Accessories . . . Pneumatic Inside Line-up Clamp . . . Pneumatic-tired Lowering-in Cradle . . . Pipe Cradles . . . Tongs, Sling Belts, Hooks, Clamps, Hand Tools, Supplies and Equipment of Every Sort.

PERRAULT 15 lb. FELT Glass Fibre Reinforced

Perrault fifteen-pound asbestos pipe wrap is reinforced with longitudinal glass fiber strands at one-fourth inch spacing. It costs no more delivered to the job, but by eliminating most shut-downs due to breakage, it costs far less on the pipe. Since it is not brittle when cold. Perrault reinforced felt is especially recommended for Fall and Spring Projects where material will be kept in unheated storage. Let us show you a sample and quote your next job. We also offer the best in other pipe wraps: Owens-Corning Glass, Kerr-McGee Outer Wrap, Kraft, and the original Rock Shield.

PERRAULT EQUIPMENT COMPANY

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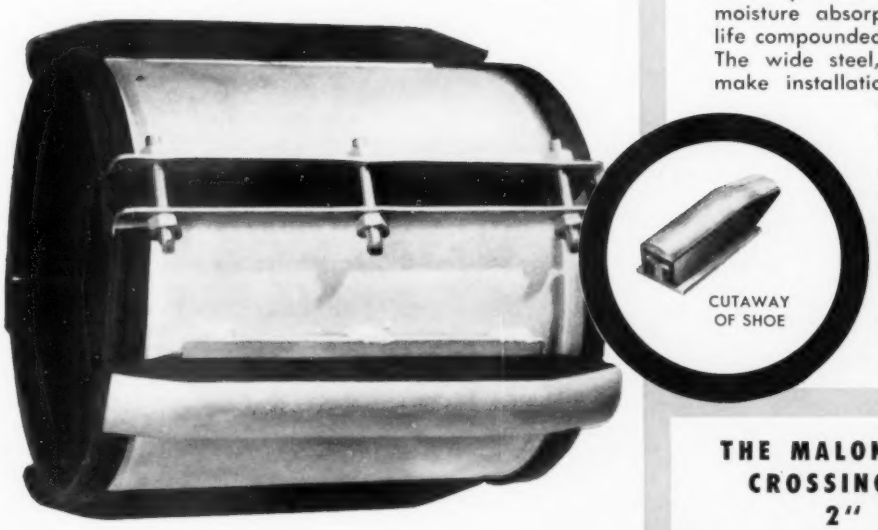
MALONEY INSULATORS for any job

LARGE

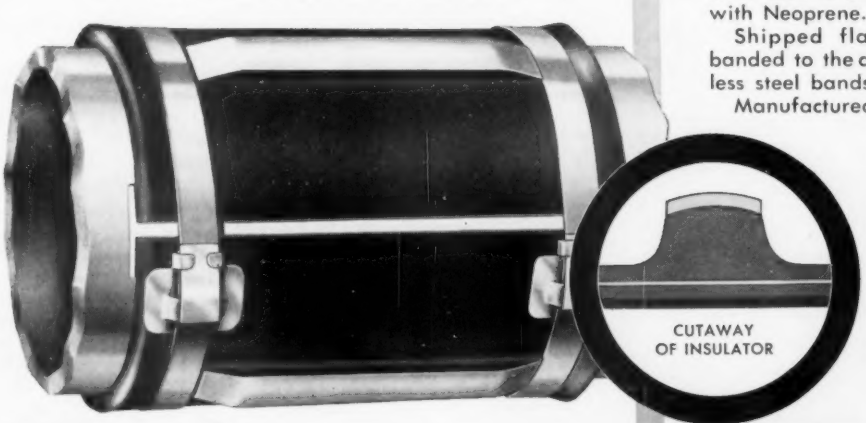


THE MALONEY MODEL 55 CROSSING INSULATOR FOR ALL SIZES OF PIPE

These insulators have superior insulation qualities because of the low moisture absorption and the long life compounded into the Neoprene. The wide steel, sled type runners make installation easy. The extra wide band affords a positive grip.

Bonded metal-to-Neoprene-to-metal, the runner insulates and also permits flexibility to compensate for pipe shifting and acts as a shock absorber to prevent damage due to sudden heavy loads.

or small



THE MALONEY MODEL 56 CROSSING INSULATOR 2" TO 12"

Manufactured with Neoprene, which is vulcanized to steel band core and to the rounded steel runners, there is no place to "short-out" between the casing and the carrier line. The steel core is completely surrounded with Neoprene.

Shipped flat, the Insulator is banded to the carrier pipe with stainless steel bands.

Manufactured in sizes from 2" thru 12", it can be used either on installations where there is only one nominal pipe size difference or on installations having a larger differential.

This is the Insulator designed and manufactured to give you the best job at a competitive price.

SINCE 1932—
PRECISION IN RUBBER—
METAL—PLASTICS

"Something from the Irishman"

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its present reserves and such additional reserves as it may by that time acquire before the certificate to operate the facilities would become final." He said he believed it preferable to require this proof before encouraging the expansion of requirements of existing customers rather than to await the filing of a new application to require such a showing. However, he said, as a practical matter there is a record of El Paso's demonstrated ability to meet its requirements when they arise, and moreover "as an equitable matter there seems to be some weight to the contention that this certificate at least will not worsen El Paso's deliverability situation."

In his dissent, Commissioner Kline said that he agreed with the FPC staff that El Paso's proposed field facilities should be certificated, but that the company should be required to show a more adequate gas supply for its entire system before certificating the mainline facilities and the sale of additional gas. Pointing out that the FPC generally has held that it is not in the public interest to grant a certificate unless a 15-year gas supply is shown, Commissioner Kline said that in this case — where the record shows that after 1958 the requirements of the present customers will exceed available gas supplies — El Paso will not have sufficient gas to meet all of its customer requirements by the time the authorized facilities are completed in 1959.

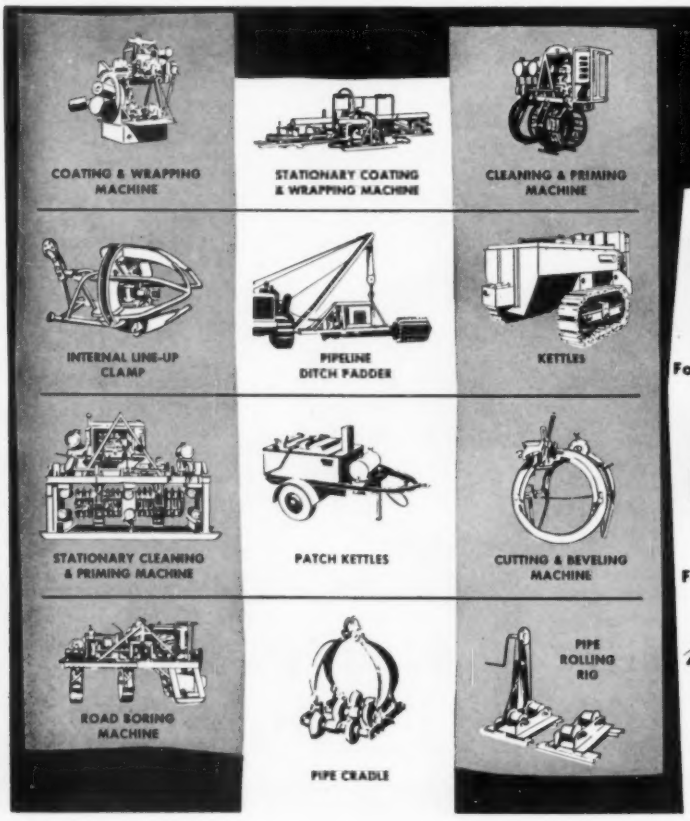
He also disagreed with the majority portion that the additional gas to be acquired by El Paso will be adequate to supply the new markets on a firm basis for 15 years. He said that this ignores the fact that this gas will be merged with existing supplies and that if El Paso has a system-wide shortage in 1959, the new markets will have no more right to the new supply than the existing markets. He said the majority also ignored the possibility that the additional gas might be used to supplement existing supplies for El Paso's present market.

While he said that he had little doubt that El Paso would be successful in obtaining additional supplies for present markets, he said that if the FPC grants a certificate in this case on this type of evidence, "We must do so in other cases and the dangers and possible ultimate damage to the public interest which will result from such a policy are obvious."

Scranton gets okay despite plea by coal interests

Stating that the "availability of natural gas clearly outweighs any detriment that may result to the coal interveners or to any other affected group," an FPC presiding examiner filed a decision ordering Tennessee Gas Transmission Co., Houston, to supply natural gas to Scranton-Spring Brook Water Service Co., Wilkes-Barre, Pa. (Docket G-10251).

A week after Scranton filed its application on June 13, TGT indicated its willingness and ability to provide the desired service. Interveners were the Anthracite Institute, United Mine Workers, Fuels Research Counsel, and eight railroad carriers. The coal interveners contended among other things that the proposal would result in bringing natural gas from Texas, Louisiana and even Canada into the "heart of the anthracite producing area."



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MODEL 211-10-P2
PIPE LINE KETTLE

10 barrel capacity, complete with hydraulically controlled agitator, and adjustable low pressure burner, self starting air cooled engine. Especially designed for contractors, or companies, who require an efficient heating kettle with less capacity, or as an auxiliary patch kettle for "Big Irish" jobs. This kettle is at home on the highway or tough pipeline terrain.

For transporting on highway

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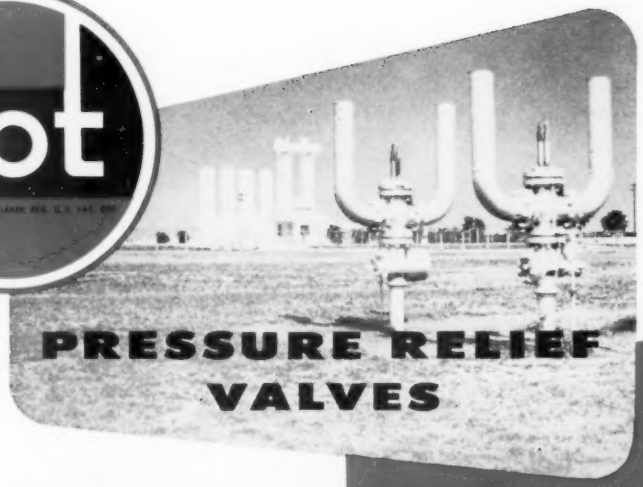


PRESSURE RELIEF VALVES

SOFT-SEAT SEAL with METAL-TO-METAL SUPPORT

Bubble-tight closure against gas or liquid is assured by the soft seat design in GOT Pressure Relief Valves. Metal-to-metal support provided by the back-up ring allows a *calculated flow* of the resilient material. The clearance groove between the seat and disk is completely filled . . . the seal is *positive*, regardless of pressure.

RESISTS ABRASION

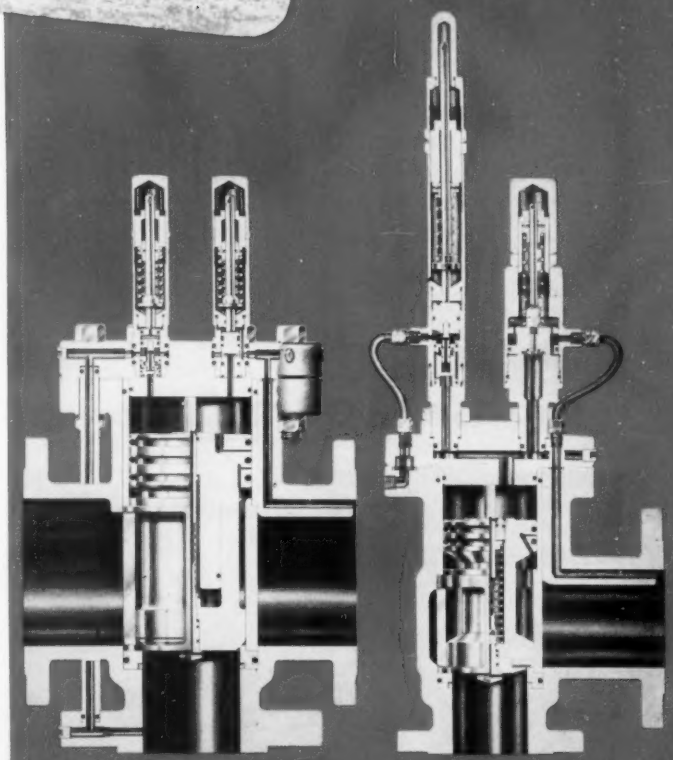
The sealing surface is protected from direct flow by the shrouding effect of the metal retainer. The *soft seat* withstands abrasion far better than the very hardest metal.

REDUCES MAINTENANCE

The sealing surface is on the top side of the seat, out of direct flow. No lapping or grinding of the seat is ever necessary. The disk is easily and quickly replaced in the field, without the need of special tools.

PROVED IN SERVICE

Hundreds of GOT Pressure Relief Valves with *soft seats* are in operation in liquid and gas service, operating at pressures from 15 psi to 1400 psi. Their performance has proved superior to any type of metal-to-metal seat valve . . . your assurance of greater safety and economy when you place them in service in *your* systems. For complete details, write for Catalog No. 556 RV.



TYPE "D" VALVE
Pressure range: 150 to 5000 psi

TYPE "E" VALVE
Pressure range: 15 to 200 psi

Garrett Relief Valves are furnished in a complete range of sizes, 1" through 8". Pressure range, 15 to 5000 psi.

Standard trim uses Monel or stainless steel in all critical areas. Stainless trim or special alloys available.

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New York, N. Y.

Examiner Richard N. Ivins found, however, that the evidence preponderates against the interveners and in favor of the applicants.

He stated that "The Natural Gas Act does not confer authority upon the commission to promote a national fuels policy, or to assign 'zones of influence or operation' to natural gas or to any other fuels." He stated that "Congress in its wisdom has not seen fit to confer jurisdiction upon the . . . commission to do what the coal interveners urge the commission to do in this proceeding. Clearly the coal interveners must prosecute their claims in another forum since such relief as they received must be obtained from Congress, and not from the Federal Power Commission."

Scranton-Spring Brook proposes to interconnect with the Hebron-Greenwich facilities of TGT, installing about 27 miles of 12-in. pipe to serve its Scranton and Wilkes-Barre divisions. Peak-day demand for the Scranton division for the first year would be 5531 Mcf and for the fifth year, 8.7 MMcf. The peak-day demand in the first year for Wilkes-Barre would be 1.4 MMcf and in the fifth year, 2.4 MMcf. Cost of the facilities is estimated at $1.6 million.

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STEEL CLAD
INSULATOR
HEAVY DUTY Insulator for Big-Inch Pipelines in OVERSIZE Casings
EXCLUSIVE "SLING JOINT" PREVENTS BAND FROM DIGGING INTO PIPE COATING
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Ready to lay line in British Columbia

Survey of the gas pipeline route to serve the interior of British Columbia has been completed by Inland Natural Gas Co., Kamloops, B. C., and actual laying of the mainline and distribution system is scheduled to begin this month.

The 304-mile mainline is in addition to 73 miles of lateral feed lines.

The first spread will start near Kelowna, and work toward Kamloops, joining with the Westcoast Transmission Co. line at Savona. The second section will work from Kelowna south to Penticton, and then move toward the Kootenay end of the line. The third section will start at Nelson and work toward the Okanagan.

Dutton-Williams Brothers Ltd. is in charge of construction.

Transco's $50 million plan approved by FPC

Transcontinental Gas Pipe Line Corp.'s $50.8 million plan to increase its system capacity by 125.9 MMcf/day has been approved by the Federal Power Commission (Dockets G-10000 and 10005). The related proposal by Trans-Carolina Pipeline Corp., Raleigh, N. C., to service the Tidewater areas of the Carolinas was denied in favor of intrastate service.

Presiding Examiner Emery J. Woodall authorized Transco to construct and operate more than 350 miles of line in Louisiana, Mississippi, Alabama, Georgia, the Carolinas, Virginia, Maryland, and Pennsylvania. Included in the program are installation of 12,750 hp in compressors and additional facilities at new and existing stations, crossings of the James and Susquehanna rivers, and various distribution meter stations. Upon completion of the project, Tranco's system capacity will be 832,944,000 cu ft per day.

Last July the FPC gave Transco temporary authority for 252 miles of the proposed pipeline and the 12,750 compressor horsepower. In

Hourly pressure information is transmitted from Northern Natural Gas Company compressor and field dispatch station to chief dispatcher's office in Omaha, Nebraska, by Bell System private line telephone.

How they protect 800,000 homes from a sudden temperature drop

There's a sudden drop of temperature in the Dakotas—and dispatchers of the Northern Natural Gas Company swing into action—to assure normal gas pressures for local distributing companies serving 800,000 domestic users through 10,000 miles of pipeline all the way from New Mexico to Minnesota!

Dispatchers, using Bell System private line telephone facilities, arrange to have certain large industrial users switch temporarily to other fuels.

Then, through contact with 35 compressor stations by telephone, dispatchers at Omaha headquarters direct the additional gas thus gained to the desired localities. A potential emergency is handled in stride, thanks to modern communications.

. . .

The Bell System welcomes the opportunity to help you obtain the most reliable and economical communications facilities. Call your Bell System representative.

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CHANNELS FOR: DATA TRANSMISSION • TELEMETERING • REMOTE CONTROL • TELEPHOTOGRAPH • CLOSED CIRCUIT TV

October the commission temporarily authorized the operation of the facilities.

Trans-Carolina sought approval of a $22 million project in the Tidewater areas of the Carolinas, but competitive intrastate projects by North Carolina Natural Gas Corp., Raleigh, and Carolina Pipeline Co., Greenville, S. C., were authorized by their respective state regulatory boards.

In denying Trans-Carolina's proposal, Examiner Woodall said that it "has failed to sustain its burden of proof that the project proposed by it would be economically, engineeringly, and financially feasible." Mr. Woodall further found "that the deficiencies in evidence introduced by Trans-Carolina prevent the determination of this record of exactly what the proposed project is, exactly what it is estimated to cost, and hence, what the evidence regarding financibility, cost of service, and rates required to be charged really shows and what retail distribution of gas by Trans-Carolina to ultimate consumers in what exact distribution areas is proposed."

The presiding examiner said the service proposed by Carolina Pipeline and North Carolina Natural is required in the areas and is feasible in every way by every applicable standard and test. He added, "as strongly supported by the commission staff's brief, such service is superior in area of coverage and cost of service to the similar service proposed by Trans-Carolina."

North Carolina Natural was allotted 39,780,000 cu ft/day and Carolina Pipeline 23,612,000 daily. Transcontinental Gas Pipe Line had proposed to deliver 60 MMcf/day to the Carolinas. The remaining 62.5 MMcf/day will go to 27 new and existing Transco customers in New York, New Jersey, Pennsylvania, Maryland, Virginia, Georgia, and Alabama.

The conflict between Piedmont Natural Gas Co., Charlotte, N. C., and the Chester (S. C.) Authority over service to Chester and Great Falls, S. C., "must be resolved under the laws of South Carolina by negotiation or by legal action," Mr. Woodall said. He concluded that "the present public convenience and necessity relates now to the only legally authorized medium of providing present natural gas service, namely, Piedmont Natural, and its proposed service of 650 Mcf/day for Chester; hence, that proposed service—the best now available—is approved. However, if and when the Chester Authority becomes legally empowered to replace Piedmont Natural as the distributor of natural gas in Chester the public convenience and necessity will then require the proposed service to Chester of 1332 Mcf/day and to Great Falls of 592 Mcf/day."

Arm's-length bargaining doesn't win rate hike

The FPC, by a 3-2 vote, dismissed natural gas rate increases totaling about $2.6 million annually by four independent producers.

The two dissenters declared that the FPC's policy of dismissing rate cases will freeze producers' rates as of June 7, 1954. The dissent said "nothing could be more harmful in the long run to the consuming public than . . . such a policy."

In the majority opinion, the commission held that evidence of arm's-length and of market value of the gas, without evidence that the increased rates are no higher

LIGHTER BUT TOUGH!

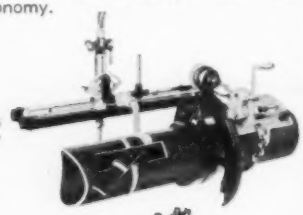
THE NEW Mathey TWIN

Made of aluminum, treated with special hardening process. Approximately 41% lighter providing fatigue free durable performance. Designated as Series L, it's available in #3-L, #4-L and #5-L, together with the standard rugged #1-S, #2-S, #3-S, #4-S and #5-S Mathey Pipe Cutting and Beveling Machines. There is no machine lighter than a Mathey Twin. There is no machine more rugged than its brother, the regular standard model. You can't beat a Mathey Machine for accuracy, speed and economy.

41% LIGHTER!

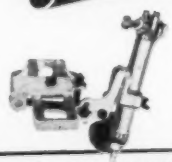
SHAPE & COUPON CUTTING

For cutting pipe to weld angular intersections to job requirements. Coupon cutting for welding analysis. Easily operated.



OUT-OF-ROUND ATTACHMENT

For accurately cutting out-of-round pipe, maintaining interval between torch tip and out-of-round pipe insuring clean, accurate cut.



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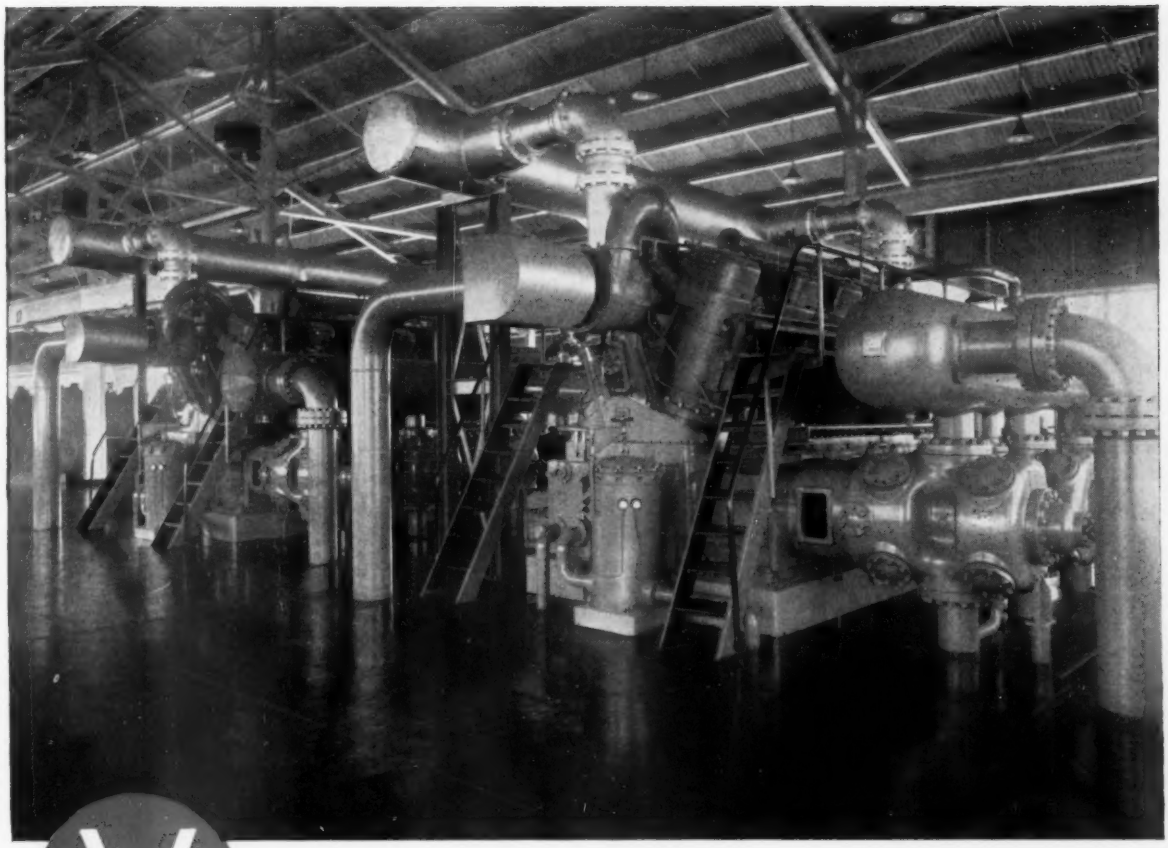

4-CYCLE V

KVS compressors are chosen for Palmyra Station of Northern Natural Gas Co.

When the Northern Natural Gas Company recently expanded its transmission station at Palmyra, Nebraska, two 2000-hp Ingersoll-Rand turbocharged KVS gas-engine compressors were put on the line to handle the capacity increase. An additional 2000-hp KVS unit is scheduled for installation at Palmyra this year.

These new 4-cycle units offer substantial fuel savings over older-type engines, floor space requirements are much smaller, and the operators appreciate the quiet operation.

Other significant features that go with the KVS include the flexibility and smooth operation characteristic of a 4-cycle unit, and the efficiency and dependability of I-R compressor cylinders with Channel Valves*.

Northern Natural was familiar with Ingersoll-Rand equipment, because there are over 75,000 hp of I-R gas-engine units at other stations of Northern and its subsidiaries. Other I-R products at Palmyra include the 4-cycle gas-engine generating units, the starting-air compressors and the cooling-water pumps.

Ingersoll-Rand equipment offers many important advantages for pipeline service. Ask your I-R representative for the complete story.

*Only I-R compressors have CHANNEL VALVES
Known for high efficiency, quiet operation and exceptional durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and leaf springs, with trapped-air spaces which cushion action.

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pipeline news • *Cont'd.*

than necessary to encourage exploration for and production of known and future gas reserves, is not sufficient to prove the justness and reasonableness of the proposed higher rates.

All of the proposed increases would affect Transcontinental Gas Pipe Line Corp. The producers are Union Oil Co. of California, Lousiana Land & Exploration Co., Morris Rauch and others, and Bel Oil Corp.

The producers proposed to increase their rates from 9.797 cents/Mcf to 17 cents, including a 1-cent gathering tax. Involved are sales from southern Louisiana gas fields.

The commission said that none of the evidence presented is designed to show what rates are needed either by individual producers or by the industry generally to further exploration or other production functions, nor can such rates be determined from the evidence.

It went on to say that the central issue presented "is one of constitutional requirements and of our statutory power." The FPC said that the applicants' testimony is faulty in supposing that "because court decisions have held the commission is not limited to the use of any one formula or combination of formulae in determining just and reasonable rates that the commission is completely unfettered in its choice of rate-making methods," and in supposing that the FPC should adopt the unregulated market as the proper guide in determining just and reasonable regulated rates.

Commissioner Stueck is FPC vice chairman

Frederick Stueck will serve as vice chairman of the Federal Power Commission during the calendar year 1957.

He succeeds Commissioner Seaborn L. Digby, who has been serving as vice chairman since Jan. 1, 1955.

Commissioner Stueck took office as a member of the FPC in July 1954 following his appointment by President Eisenhower and confirmation by the U. S. Senate for the term expiring June 22, 1959.

Upton county construction authorized for El Paso

The FPC has granted El Paso (Texas) Natural Gas Co. temporary authorization (Docket G-11216) to acquire and operate existing natural gas facilities and to construct and operate proposed facilities in Upton county, Texas.

El Paso plans to acquire the McElroy-Wilshire plant and related compression and gathering facilities from Lone Star Producing Co. In order to make available for processing additional volumes of gas, El Paso will lay 38 miles of various diameter pipelines; add 2640 hp to that proposed to be acquired from Lone Star; and make additions to the gasoline plant to enable it to process high liquid content gas.

The cost of these facilities is estimated at $1.1 million for the gasoline plant and about $1.4 million for the new facilities. El Paso and Hunt Oil Co. would each pay one half of the cost of the acquisition and construction.

GAS progress reports

CURRENT CONSTRUCTION

ALBERTA GAS TRUNK LINE CO. LTD., to build 550-mile gathering line in Alberta. 1956 construction consisted of Red Deer river crossing near Bindloss.

COLORADO INTERSTATE GAS CO., Colorado Springs. Docket G-2121-(1956 program) 239 miles of 22-in. line from Laramie, Wyo. to connection with Pacific Northwest Pipeline Corp. line at Green River, Wyo. R. H. Fulton will start two spreads April 15. Nov. 1 completion schedule delayed due to late pipe delivery.

EL PASO (TEXAS) NATURAL GAS CO. Docket G-10481 to install 28.1 miles of 10¾-in. line in Nolan and Coke Counties, Texas; install new 1320-hp compressor station at Jameson. Line completed. Work underway on compressor.

EL PASO (TEXAS) NATURAL GAS CO. Docket G-8940. To build 338-mile, 34-in. loop line from San Juan basin to a point on California - Arizona border near Topock, Ariz., to increase supplies to existing customers. Completion scheduled for April.

MICHIGAN WISCONSIN PIPE LINE CO., Detroit. Docket G-2327 15.5 miles of 4- and 6-in. line to Three Rivers, Mich. under construction; 25 miles of 24-in. in Wisconsin and 18.5 miles of 4-in. in Iowa, Illinois, Wisconsin and Michigan authorized and scheduled for completion this year. All other construction under this docket has been completed and is in operation.

(*Continued on page* 148)

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progress reports • *Cont'd.*

MONTANA-DAKOTA UTILITIES CO., Minneapolis. Docket G-10521. Remaining compressors (two 540-hp at Baker, Mont.) scheduled for installation next summer.

MOUNTAIN FUEL SUPPLY CO., Salt Lake City. Dockets G-10426 and 10446. To build 38 miles of 20-in line and compressors to transport from Sweetwater county in southern Wyoming 60 MMcf/day purchased from Pacific Northwest Pipeline Corp. Also 2640 hp addition at existing compressor station. 5 miles line and compressors completed. Balance pending.

NORTHERN NATURAL GAS CO., Omaha. Dockets G-2399, et al, for 654 miles of line and an additional 12,640 hp in compressor capacity. Also 15-mile 24-in. line from Ogden, Iowa to underground storage near Redfield; 168-mile 20-in. from Twin City area to Duluth and Superior; 92-mile 12-in. and 71-mile 10-in. line in South Dakota and 307 mile of branch lines. Compressor additions and 15-mile line to test Redfield storage project approved. Contracts for compressors and line let to H. B. Zachary, Dresser Engineering Co., Foor Engineering Co., R. H. Fulton & Co., and Pentzien Inc. Newly approved portion includes a total of 354 miles of line and 18,640 hp in compressor capacity broken down as follows: 163-miles extension from Sioux Falls, S. D. area to Aberdeen, S. D. plus 160 miles of branch lines in South Dakota. Not approved is the Duluth-Superior extension.

PACIFIC GAS & ELECTRIC CO., San Francisco. For 83-mile 20-, 18-, and 16-in. line from Beehive Bend field near Willows, Calif., to a point near Davis and then east into Sacramento.

PACIFIC GAS & ELECTRIC CO., San Francisco. Midwestern-Johnson-Dixon at work on 85-mile, 34-in. line paralleling Super Inch from Topock, Ariz. to Milpitas, Calif. Other contractors at work on 6620-hp additions at Topock and Kettleman compressor stations.

PERMIAN BASIN PIPELINE Co., Omaha. Dockets G-9688 and 9724. For 19-mile, 16-in. line and 6750-hp compressor station in Andrews county, Texas, to take gas from Phillips gasoline plant. Gasoline Plant Construction Corp. Houston building compressor station; R. H. Fulton the line.

SOUTHERN CALIFORNIA and SOUTHERN COUNTIES GAS CO., Los Angeles. To build 236-mile, 30-in. line from Newhall, Calif. to Topock, Ariz. on Colorado river to meet El Paso Natural line from San Juan and Permian basins. Also three 1760-hp compressors at Topock. R. H. Fulton & Co., Lubbock, Texas, has contract for line. Initial work to begin this month. Scheduled for completion in June, 1957.

TEXAS GAS TRANSMISSION CORP., Owensboro, Ky. Dockets G-8828, 10062, 10395, and 10698, to lay approximately 240 miles of line along its system in Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, Indiana, and Illinois and to add 31,510 hp. Work completed on 176 miles of line; compressor construction approximately 85 per cent complete. Completion of pipe work expected about Dec. 20; compressor work prior to Jan. 1. Pipeline construction contractors: Houston Contracting, Williams Bros., Union Construction, Pentzien Inc., Modern Welding, and Ashy Construction. Compressor contractors: Longview Equipment and Ford, Bacon & Davis.

TEXAS EASTERN TRANSMISSION CORP., Shreveport. Dockets G-2503, 9784-87. 422 miles of 30-in. line near Mexican border to transport gas to Texas Eastern's Vidor, Texas station; approximately 45 miles of 24-in. pipe connecting TET's existing line near Provident City, Texas, to the new line; pipeline loops totaling about 77 miles at various locations along existing 30-in. system; approximately 147 miles of supply and sales laterals; new and additional compression facilities totaling 32,250 hp; and approximately 20 sales measuring and regulating stations.

TRANS-CANADA PIPE LINES LTD., for 2287-mile gas line taking Alberta gas from Alberta - Saskatchewan border to Toronto and Montreal, with lateral from Winnipeg to Emerson, Man., 34-in. line from Alberta border to Winnipeg under construction. 30-in. from Winnipeg to Toronto; 24- and 20-in. from Toronto to Montreal; 24-in. from Winnipeg to Emerson; 10 compressor stations totaling 105,000 hp. First four sections of line under contract to Majestic Contractors Ltd., Mannix Ltd., Canadian Bechtel Ltd., and Dutton-Williams Brothers. By November, 230 miles of 34-in. had been ditched.

WASHINGTON (D.C.) GAS LIGHT CO. Docket G-10090 for 26.1-mile, 24-in. line from Dranesville, Va. to a point near Washington. Work nearly completed.

WESTCOAST TRANSMISSION CO. LTD., Calgary. To build 650-mile, 30-in. line from Peace river area to near Vancouver, B. C., to connect with line of Pacific Northwest Pipeline Corp., to transport 400 MMcf daily, of which 300 MMcf is to be delivered to PNW. 400 miles of line installed and ready for testing. Scheduled for completion in fall of 1957.

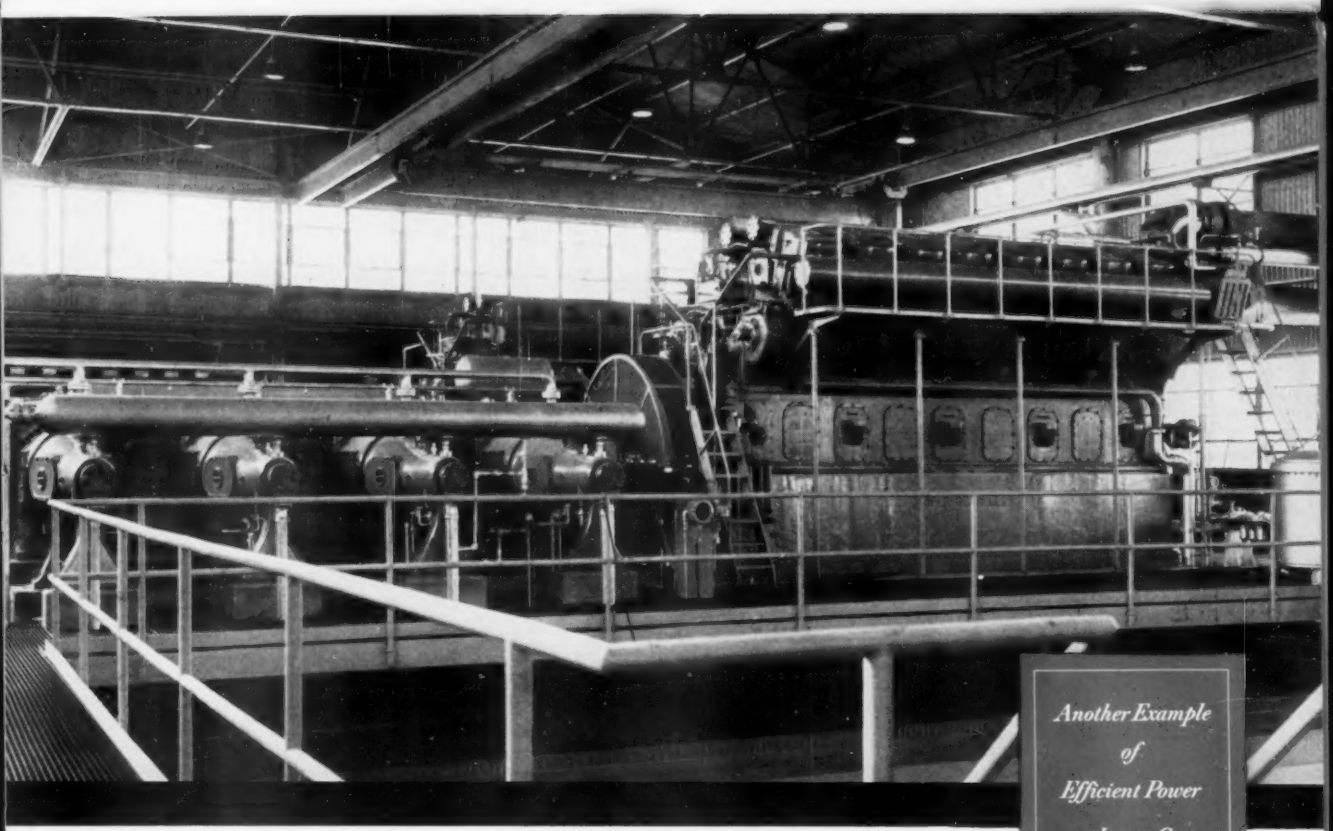
APPROVED

COASTAL TRANSMISSION CORP., Houston. Docket G-9960. For 565.7 miles of mainline extending from Hidalgo county, Texas, through Texas and Louisiana to proposed connection with Houston Texas Oil system near Baton Rouge. Would also build 272 miles of laterals and 4 compressor stations totaling 26,000 hp.

EL PASO (TEXAS) NATURAL GAS CO. Docket G-10499 to build 888 miles of field lines and mainline and 56,990 hp in compressor capacity in Texas, New Mexico, and Arizona in order to deliver 70 MMcf/day addition to SoCal and SoCounties Gas companies and 75 MMcf/day to Pacific Gas & Electric.

HOUSTON TEXAS OIL & GAS CO., Docket G-9262. For 961 miles of 26-in. mainline from connection with Coastal Transmission Corp. on east bank of Mississippi river near Baton Rouge, across Mississippi, Alabama, and Florida to terminus in Dade county, Fla. near Cutler and Miami. Would include 496 miles of laterals and 5 compressor stations totaling 42,000 hp.

SCRANTON-SPRING BROOK WATER SERVICE CO., Wilkes-Barre, Pa. Docket G-10251 to build 13.4 miles of 12-in. lineconnecting Scranton division and 24 miles of 12-in. interconnecting Scranton and Wilkes-Barre division with Tennessee Gas Transmission Co.



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Similarly, the plant contains two LS-8 engines, rated 1852 hp at 330 rpm, combined with JM-5's for the compression of three separate gases on three individual services . . . air from 120 psia to 630 psia, natural gas from 115 psia to 430 psia and nitrogen from 35 psia to 330 psia.

Although scheduled for continuous full-load duty, these Cooper-Bessemer units can be easily operated at variable loads as required. In addition, they offer *extra* economy because they can operate efficiently, dependably on natural gas, diesel fuel or any combination of these fuels.

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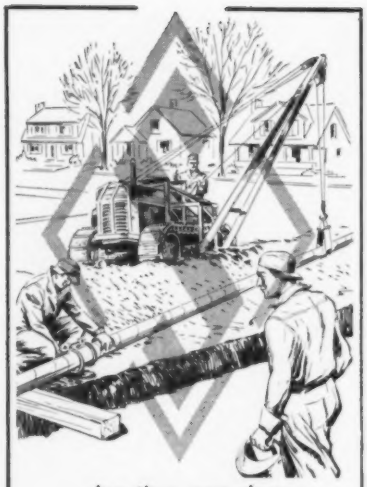

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GAS pipeline people

JOHN E. KEARNS has been appointed manager of Bristol Co.'s new district sales office at San Francisco. He has been with the company since 1936.

CREIGHTON R. HODGES, JR., has been named chief accountant for Texas Eastern Transmission Corp., Shreveport. In his new capacity, Mr. Hodges will supervise the entire accounting function for the company.

ROBERT L. KIDD and HARRY D. HANCOCK have been elected directors of Cities Service Co. Mr. Kidd is president of Cities Service Oil Co. and Mr. Hancock heads Cities Service Gas Co.

Wilton Scott
Tennessee Gas

R. R. Dean
Tennessee Gas

John E. Kearns
Bristol

C. R. Hodges, Jr.
Texas Eastern

N. C. KYMES has been named superintendent of the Fittstown (Okla.) natural gasoline plant of Kerr-McGee Oil Industries Inc. He succeeds FRED FOX, who has resigned. KENNETH SMITH succeeds Kymes as field superintendent of the Milfay (Okla.) plant and C. H. BRADY is now manager of the natural gasoline department.

LLOYD J. TAYLOR has joined Trunkline Gas Co., Houston, as superintendent of the land department for production activities. Most recently, Mr. Taylor was district manager for Midstates Oil Corp.

NEAL B. LAU BACH, vice president of Hudson Engineering Corp., Houston, has been elected vice president-operations of Colorado Interstate Gas Co., Colorado Springs.

WARREN E. RICHARDSON has been promoted to the newly created post of technical service, process equipment of Black, Sivalls & Bryson Inc., Kansas City, Mo. The new post was created to provide added facilities for broadened industry consultation on production problems involving process equipment.

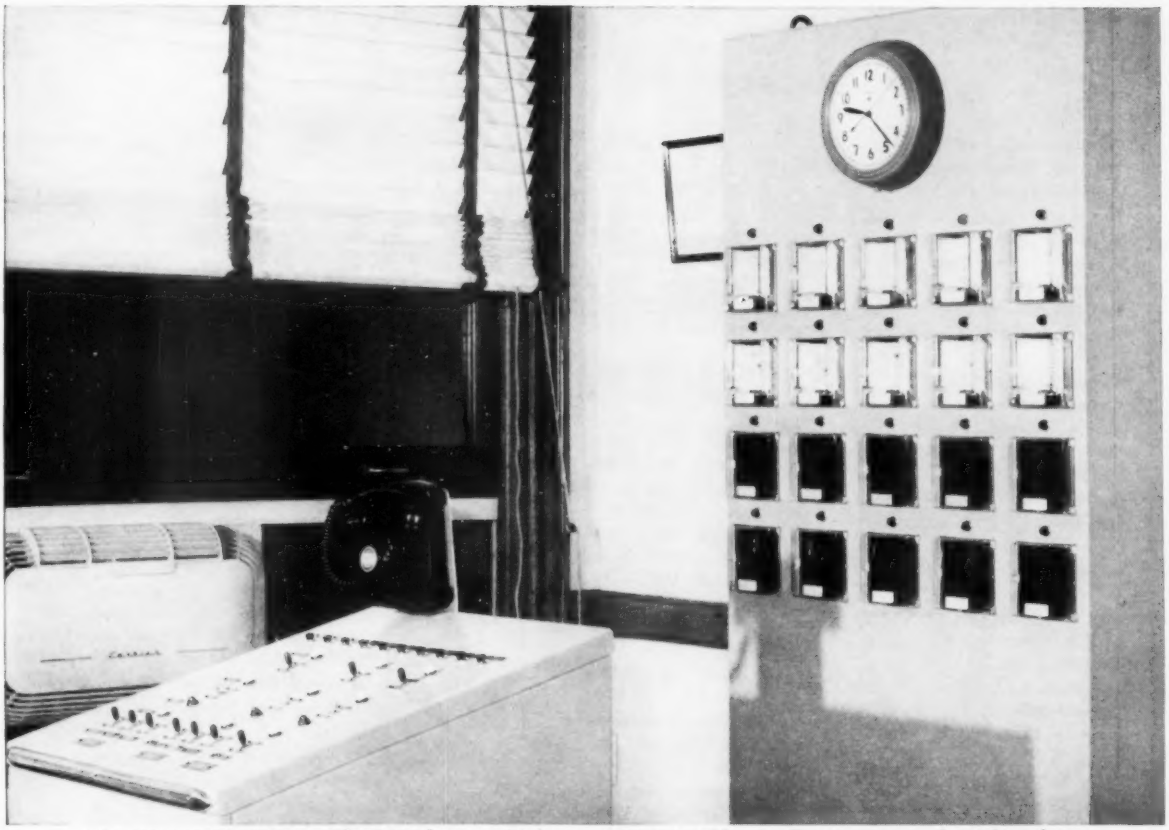
JOHN CUTURILO has been appointed to the welding unit of the materials and processes laboratory of General Electric Co.'s large steam turbine-generator department, Schenectady, N. Y.

CHARLES R. HETHERINGTON, vice president of Pacific Petroleums Ltd., Calgary, Alta., Canada, has been named president and director of X-L Refineries Ltd., Dawson Creek. X-L was recently acquired by Pacific and will be operated in conjunction with the new natural gas scrubbing plant at Taylor, B. C.

Tennessee Gas Transmission Co., Houston, has promoted two top executives. R. R. DEAN, formerly vice president, is now senior vice president in charge of manufacturing and marketing. WILTON E. SCOTT, exploration manager, was elected vice president.

Kaiser Steel Corp. has appointed A. L. PEAKE assistant manager of the central district sales office in Oakland, Calif. He succeeds MARK ANTHONY, recently named assistant to the vice president and general manager of Kaiser. Succeeding Mr. Peake as assistant sales manager in the southern district sales office in Los Angeles is FRED G. BREAR.

V. E. STINEMAN has been promoted to district sales manager for General Electric's Communication Products department in Los Angeles. He replaces KENT WORTHEN, who has joined the Communication Products headquarters staff in Syracuse, N. Y.



GAS DISPATCHER'S DESK at The Manufacturers Light & Heat Company's Pittsburgh office. The miniature Bristol Metameter Telemeter Receivers on panel at right make possible this ultra compact installation.

New miniature telemeters!

BRISTOL instruments make possible complete installation in small space.

Gas dispatcher at Manufacturers Light & Heat Co., Pittsburgh, Pa., does a full-sized job *in a fraction of usually required space.*

The miniature Bristol Metameter Telemeter Receivers in this highly integrated, compact station give the gas dispatcher eight continuous pressure readings from three remote regulator stations—from 7 to 30 miles away. Switches on the console let the dispatcher raise or lower the downstream pressure at any stations.

And all this in the office space taken up by two stenographer's desks!

Bristol Metameter® Telemeters—full-size or compact—can solve your remote measurement and automatic control problems as they have for hundreds of users in utilities, pipeline companies, and manufacturing industries. You'll find a Bristol system for every application: pressure, vacuum, liquid level, flow, temperature, static and differential pressure, motion, voltage, current, power and totalized load. For complete information write: The Bristol Company, 119 Bristol Road, Waterbury 20, Conn.

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REMOTE REGULATOR STATION. Three Bristol Metameter transmitters (left) and two Bristol Series 500 pneumatic controllers transmit data to dispatcher—miles away—and automatically carry out his instructions.

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LOW TEMPERATURE BS&B SEPARATION

COLD-FRAC* SYSTEM

When Your Gas Condensate Wells...

1 Are Extremely High Pressured

MDH COLD-FRAC Systems will give condensate recoveries comparable with more elaborate low temperature separation systems when the pressure reduction across the choke is sufficient to produce a temperature drop of 80° F. or more. This is normally obtained with inlet pressures of 4,000 psi or more and with the low temperature separator operated at approximately 1,000 psi or less. Special heat exchanger achieves maximum cooling with minimum pressure drop through counterflow with cold sales gas.

2 Produce Wax and/or Salt Water

The highly efficient BS&B Model DC Liquid Knockout is an integral part of the MDH COLD-FRAC System. It effects maximum scrubbing efficiency by removing particles 10 microns in size and larger. This inlet knockout handles the maximum rated gas capacity without carryover while handling a normal volume of liquid. Waxy oils and salt water are efficiently removed and bypassed around the heat exchanger and choke, eliminating operating problems and refrigeration losses.

3 Have A Pressure Life of 3 to 5 Years

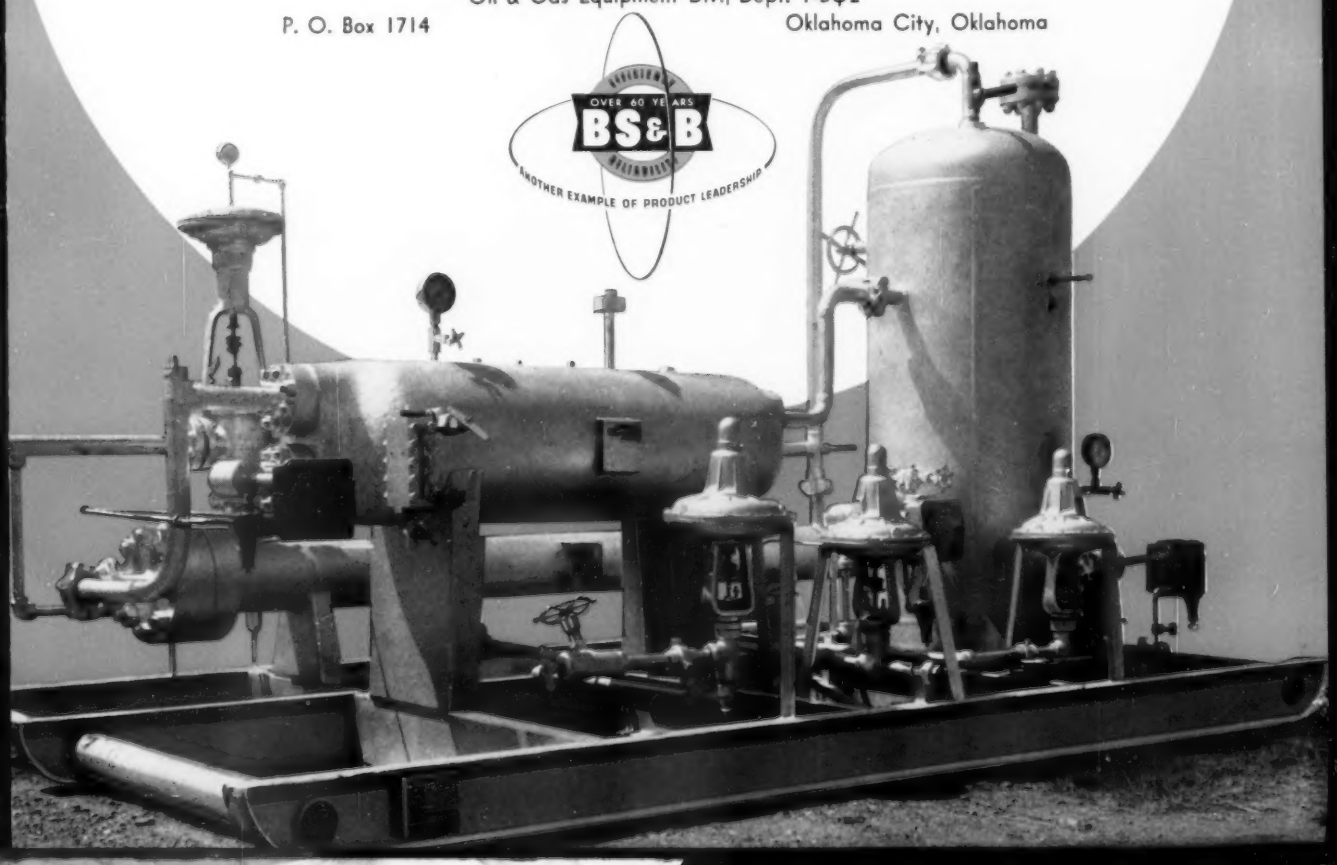
MDH COLD-FRAC Systems are especially suitable for wells with a pressure life of 3 to 5 years, which normally maintains the proper balance between initial cost and added recovery. If the pressure life of the well is less than 3 years, the BS&B ECON-O-MAX unit should be considered; if more than 5 years, the GDH COLD-FRAC (with hydrate inhibitor) will insure maximum recovery throughout the extended life of the well.

Ask Your BS&B Representative For Details, Or Write To...

BLACK, SIVALLS & BRYSON, INC.

Oil & Gas Equipment Div., Dept. 1-BQ2

P. O. Box 1714 Oklahoma City, Oklahoma



it can't be measured or seen . .

but it can be proved . . .

that sustained accuracy in Sprague Gas Meters over extended periods of service with a minimum of maintenance is the rule. Such proven performance can be consistently achieved only when quality materials and fine workmanship are combined with simplified design to produce a product outstanding in its field.

THE *Sprague* METER COMPANY
BRIDGEPORT 4, CONNECTICUT

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Gas Meters of Simplified Design and Sustained Accuracy